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Management Digest

1957 OVERSEAS EDITION

Materials handling: Modern management's greatest opportunity to cut costs — p65

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Management Digest®

AUGUST 1957
VOL. 12 No. 8

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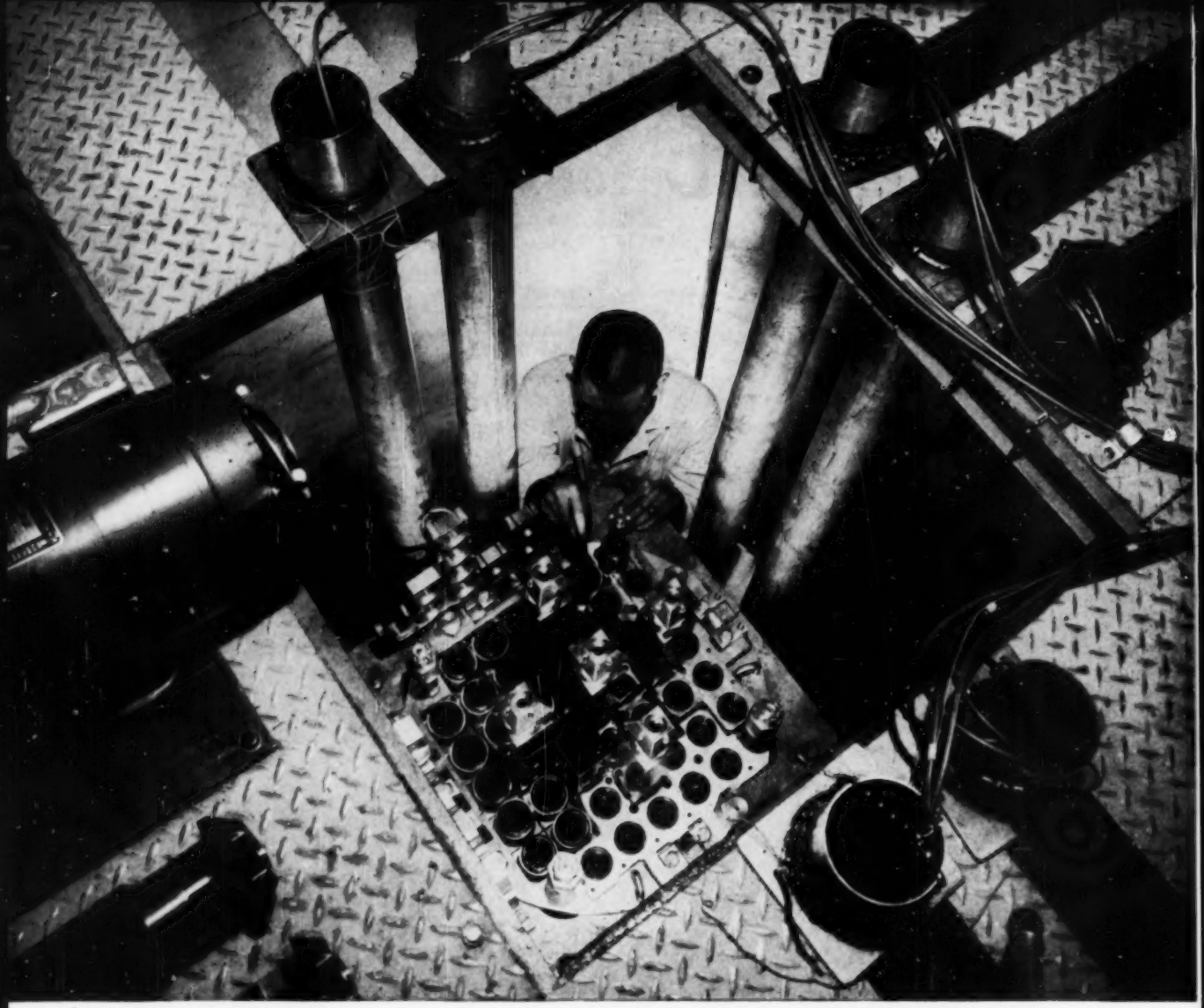

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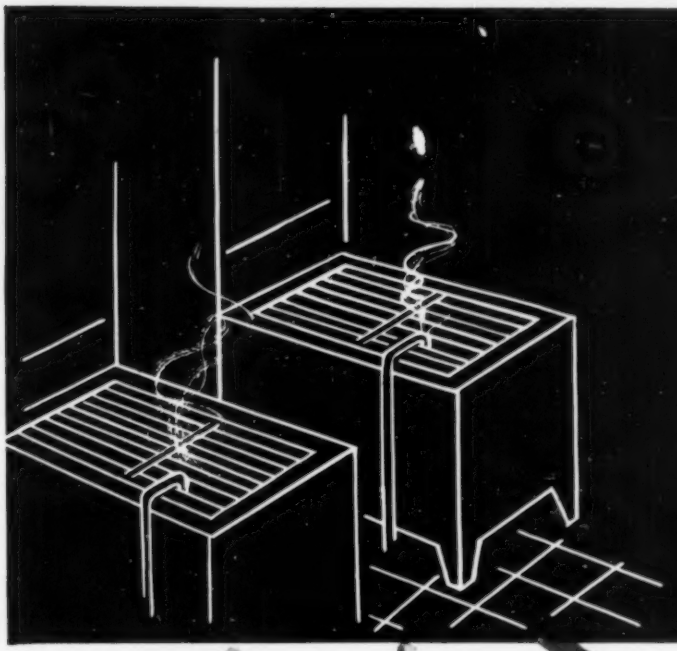

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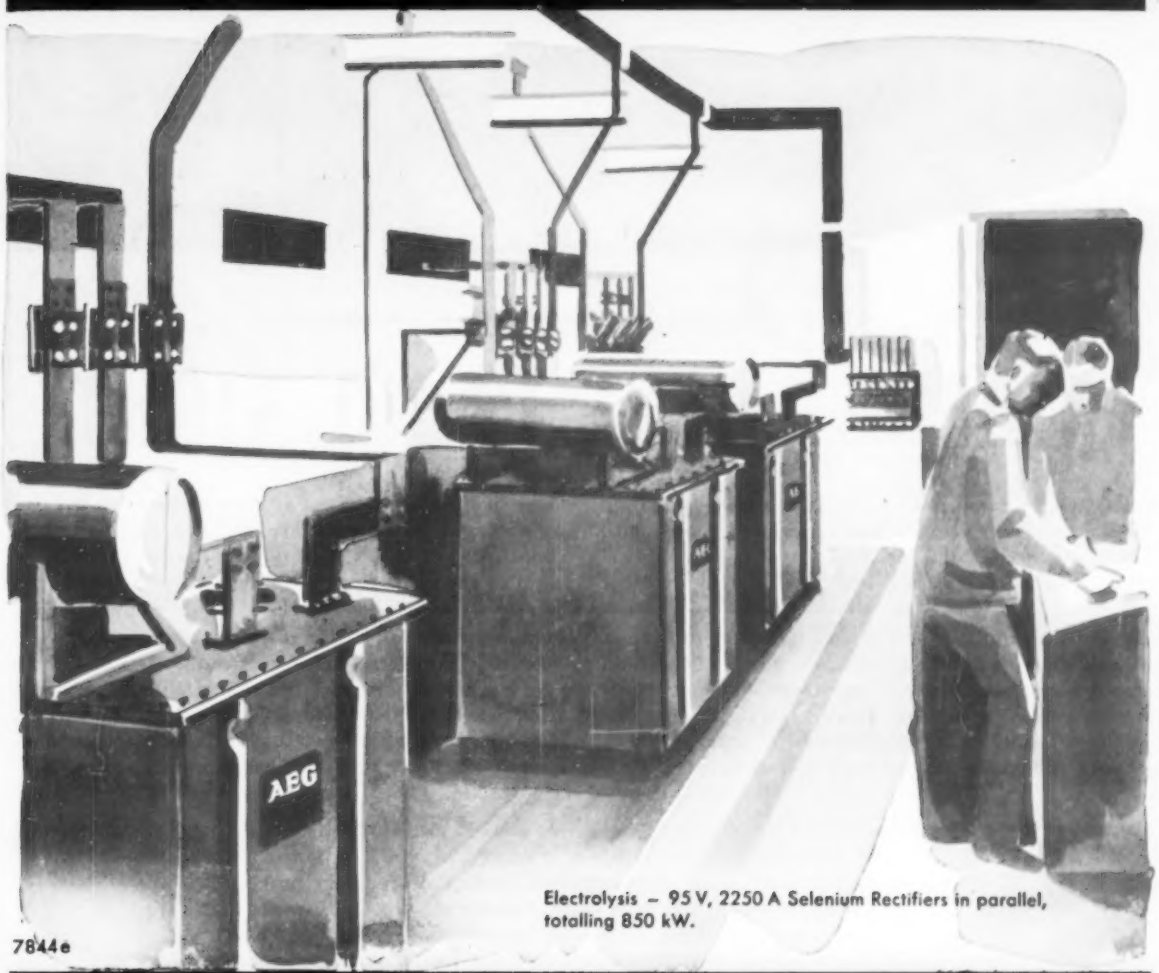

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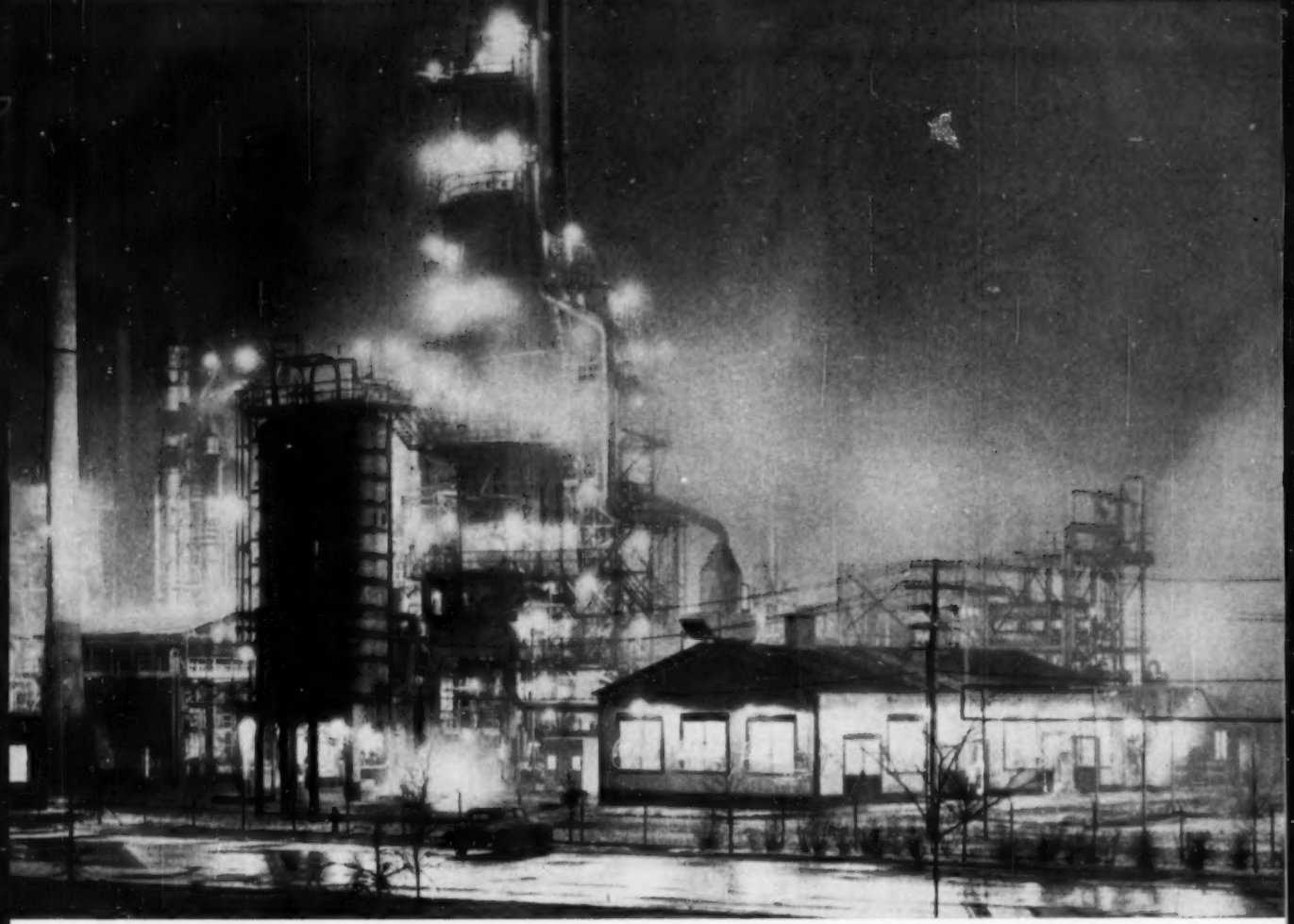

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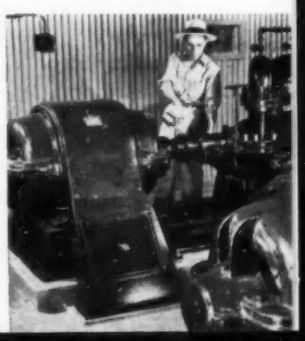

GENERAL ELECTRIC

—U.S.A.—

WORLD TRENDS

PRESSURE ON THE POUND

While the dollar's role in world trade and finance may be growing (page 13), businessmen have to keep a sharp eye on the pound sterling. Here is a brief look-ahead on sterling, as seen from London by the editors of The Economist:

No sterling crisis is likely in 1957. That is a welcome prospect when you recall that every odd-numbered year since the war—save 1953—has brought trouble.

Britain itself will probably run a balance-of-payments surplus (see MD, June, p15). And despite Suez and lower raw material prices, the overseas Sterling Area's deficit may be smaller. There ought to be, The Economist says hopefully, a net addition to the Sterling Area's gold reserves.

Financing economic development is becoming one of the crucial, long-term problems of the Sterling Area.

In each of the last six years—again excepting 1953—the overseas Sterling Area has run a combined payments deficit. It is usually argued that these fast-developing nations should be running deficits, while the mature British economy carries a surplus. This is not quite what has happened, declares The Economist. Instead, "the deficit of the whole area has been due to different members, at different stages, going suddenly on a drunk." Britain may have been the culprit in 1951; Australia, in 1951-1952 and partly 1955; and now India.

Look at the present Indian and Australian situations:

India is in serious trouble. In the first year of the Second Five Year Plan, India spent $1,500-million of the total $1,700-million budgeted for industry and agriculture expansion. Imports have soared, foreign exchange reserves have plummeted, prices are rising. Yet India's need for foreign credit and capital goods is still huge—and must be satisfied if the crucial development program is to succeed.

Australia this year seems to be compensating for India's pressure on Sterling Area reserves. The nation's economic fortunes turned up "spectacularly" in the year ended July 1—for two reasons, according to the National City Bank of New York: (1) Record wool output and high wool prices, which promise Australia a "wool cheque" of the equivalent of $1,000-million; and (2) tight credit, import controls, other austerity measures, which have restrained a development boom that might have gotten out of hand. Yet Australia faces severe problems—especially inflation—and it too needs a great deal of foreign credit and capital goods.

This "voracious appetite for industrial development," says The Economist, will place the greatest demands on the Sterling Area in the immediate future. India's experience shows what can happen. Development in Africa—in the Rhodesias and Ghana, for example—will strain sterling's resources. And before long, Australia, Malaya, and the new West Indian Federation may appear in the capital markets of the world.

CHINA IN THE HEADLINES

Communist China has burst back into the headlines—and everyone is speculating about (1) the political and economic situation inside China,

Turn the page for more WORLD TRENDS

and (2) the growing possibility of expanded trade with Peking.

Here is how some American observers interpret the news:

Mao Tse-tung's recently published speech (in which he added to the ideological confusion of the Communist world) tells a lot. He admitted that there isn't enough food, and that the country dare not let population pass much beyond 600-million. He admitted that industrial production cannot be increased fast enough to permit higher real wages.

The implication is clear: An investment policy based on under-consumption, as Soviet policy is, brings dangerous tension between the Communist party and the people. And it seems apparent that Mao is trying to consolidate, slowing the pace of Soviet-style economic growth in China.

What about trade? With Britain in the van, many Western nations have eased their strategic embargo on shipments to China, and Japan is chafing to do the same. As MANAGEMENT DIGEST went to press, Austin Motor Co. Ltd. appeared to have the first major order since the relaxation—$300,000 worth of truck chassis and engines.

Most observers will be greatly surprised if a big jump in China trade results. More than 80% of Peking's trade is tied to the Soviet bloc, and there are still many products (just what the Chinese want most) on the embargo list.

Meanwhile, the Khrushchev "coup" in Moscow was roundly cheered by China and the European satellites. With no dissension inside the Kremlin, there should be less ideological bickering in the Communist world. But at the same time, leaders like Mao Tse-tung of China and Tito of Yugoslavia have gained in independence. And the armaments negotiations in London may provide China with a side door to a fuller role in world affairs.

MILESTONE FOR MERGERS

The merger has been one of American management's favorite methods of company growth—and there are signs of a new "merger trend" in Europe. But now, in the U. S. A. at least, merger-minded managers have been dealt a stunning blow.

The U. S. Supreme Court has decided that the antitrust laws may make illegal "vertical integration" (merger with a supplier or customer). In the past the laws have been applied primarily in cases of "horizontal integration"—the acquisition of a competitor. The specific ruling: E. I. du Pont de Nemours, the huge chemical concern, has violated the laws by virtue of its ownership of 23% of the stock of its largest customer, General Motors Corp.

The ruling will probably bring no major operating changes for the companies. The next few years will be involved in the financial aspects of the case, deciding what to do with du Pont's big block of stock.

But for the business community at large, the implications are far-reaching, if not completely clear. Businessmen note that du Pont purchased the GM stock 40 years ago—so who knows how many present corporate organizations might be illegal. As for the future, note that many companies have called off merger negotiations for the time being.

Remember that many important industries in the U. S. A. are dominated by large corporations. The giants grew through mergers—but most thought they knew just where they stood under the antitrust laws. Now, no one is sure.

Foreign businessmen who deal with American companies will be more confused than ever. The courts have already ruled—in several cases—that the antitrust laws apply to American firms' international operations.

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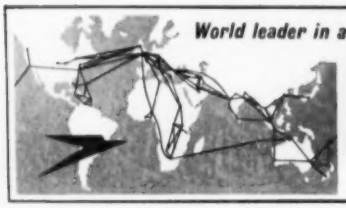

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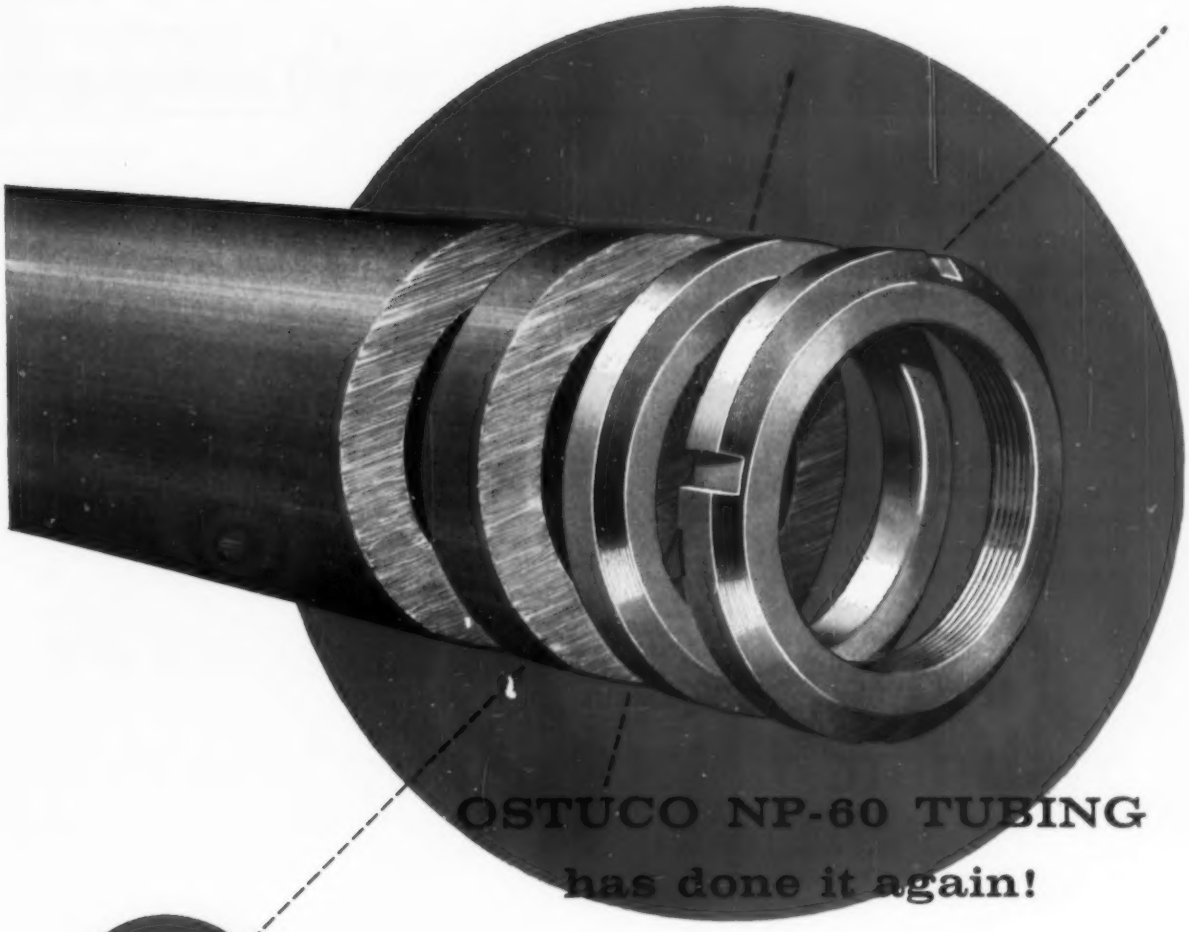

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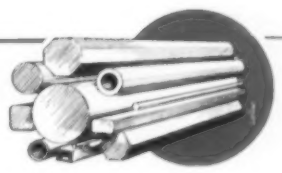

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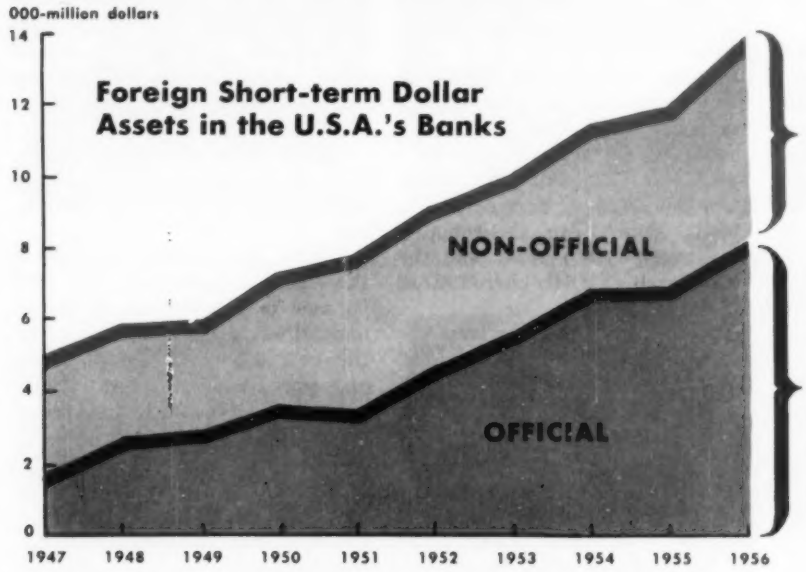


NON-OFFICIAL dollar assets — in deposits, acceptances, Treasury bills — are held by private banks, insurance firms, other businesses.

OFFICIAL dollar assets held by foreign central banks and other authorities — for operating balances and as monetary reserves.

A World on the Dollar Standard

THE chart above is the kind usually found in the offices of international bankers, finance ministers, and economists. But it tells a significant story to businessmen—the story of a mighty flow of money toward the U.S.A.

Look behind the statistics and you see a new system of carrying on the world's financial dealings. It is making New York City the world's premier money market center, and it is placing a large number of countries on what might be called a "dollar exchange standard." Here is what is happening:

—**The American dollar has become increasingly attractive relative to gold as an international store of value.** In fact, some central banks keep their international monetary reserves largely in the form of short-term dollar assets rather than the yellow metal.

—**The dollar is used more and more as a means of settling international accounts.** Not only has the dollar become more important relative to gold, but also more important relative to sterling.

Are these trends healthy? Dr. F. H. Klopstock, the noted balance-of-payments expert at the Federal Reserve Bank of New York, believes they are. In a new study of the dollar's role in the world (see box), Klopstock declares that the "dollar standard" may prove far superior to the gold exchange standard of the 1920s.

Today's improved world economic climate, writes Klopstock, is in part a result of the sharp rise of foreign dollar assets. These have helped make possible liberalization of trade and payments abroad; they have made a big addition to the world's monetary reserves. These reserves, in turn, seem more stable: There has been much less of the sudden, capricious shifts of official reserves from one money market to another that marked the 1920s.

Also, Klopstock argues that the presence of rising dollar assets in New York has strengthened the desire—and the ability—of American banks to provide credit and services to foreign governments and businessmen.

The past 35 years have seen several marked increases in foreign dollar assets in the U.S.A. Trouble in Europe, and the lure of the Wall Street stock boom, brought $2,500-million to the U.S.A. between 1921 and 1929. Then the depression, the depreciation of sterling, and the devaluation of the dollar caused that money to flow out in the early 1930s. But soon another "flight to the dollar" was underway, this time bringing $3,400-million to the U.S., 1934 to 1939.

From 1940 to 1946, dollar assets went up and down according to the fortunes of war, later dropped fast as "Lend Lease" ended. Then, in 1947, a decade of increases began. It has carried foreign short-term dollar holdings in the U.S.A. to an unprecedented $13,400-million (chart, above).

The bulk of this increase has been in the accounts of central banks, and agencies such as stabilization funds and foreign exchange offices. The rise became possible because of the continuing

Dr. Klopstock's essay, "The International Status of the Dollar," can be obtained from the International Finance Section, Dept. of Economics, Princeton University, Princeton, N. J., U.S.A.

cash surplus in the rest of the world's balance of payments with the U.S.A. Huge aid and military spending, U.S. tourism, other imports have allowed many nations to add to dollar reserve.

The striking thing is that these official foreign dollar gains have not been used to acquire much gold—only about $1,200-million net has been converted to gold. It is worth noting that if foreign governments had converted most of their dollar acquisitions to gold, the resulting drain on the U.S. gold stock might have caused a drastic revision in Washington's foreign economic policy.

The need for larger dollar operating balances partly explains the foreign decision to build up dollar assets. Yet foreign monetary authorities do not need $8,000-million for operating purposes. Many governments seem to regard their dollar holdings in the same manner as their gold reserves: Both are considered international stores of value.

This does not mean that foreign nations are all holding less gold, but rather that the ratio of official dollar reserves to official gold reserves has risen. The rise is dramatic: from a mere 17.7% in 1947 to more than 50% of total official gold holdings.

Another factor behind the new dollar-gold ratio is the rise in reserves generally. Foreign central banks have decided to invest more of their larger total in dollar-earning assets.

The rise in private holdings of short-term dollar assets has lagged behind official holdings—for the simple reason that commercial banks and other businesses either prefer, or are required, to sell net dollar acquisitions to their central banks. Nonetheless, the non-official funds are growing.

Some are merely in the U.S.A. for safekeeping, but the bulk of the money consists of operating balances. Requirements of banks, businessmen, insurance companies, for working dollar balances have soared in recent years. U.S. foreign trade is now playing a much more dominant role in world commerce, and businessmen and banks in many nations now insist on being paid in dollars.

Mounting foreign dollar assets in the U.S. are not regarded as an unmixed blessing by many Americans. Some are concerned about the impact of these foreign dollar operations on the domestic money market and credit policies. And you hear worries that claims on the U.S. gold stock have become too large for comfort. The gold hoard at Fort Knox is now $22,000-million. Against that are the $13,400-million in foreign dollar assets (which can theoretically be converted into gold) and the legal cover of U.S. currency, at $12,000-million.

Dr. Klopstock tries to calm the fears. A "flight from the dollar" is highly unlikely, he believes, because of the U.S.A.'s "exceedingly strong" international economic and financial position. Further large increases in the foreign holdings might be worrisome, but Dr. Klopstock doubts that they will occur. A number of factors will combine to persuade foreign governments to reduce the rate of their dollar build-up and perhaps purchase goods and services instead.

Indeed, there are signs now that foreign short-term dollar holdings were drawn down slightly in the first half of 1957.

Finally, most observers believe the U.S.A. will learn to live with its new responsibilities in the financial world. They point out that the new status of the dollar is one more reason why the dollar must be kept strong by sound monetary and fiscal policy.

U.S. Cars at the Crossroads?

Digested from THE AMERICAN AUTOMOBILE, Aug, p32

THE U.S.A. created the mass-market automobile, and that large, powerful machine has had a lot to do with shaping the mobile, suburbanized American society. Now, the distinctive American car may be standing at a crossroads in its development.

Two events tell the story:

U.S. automakers agreed in June to abandon their increasingly frantic emphasis on more speed, more power, in advertising and selling. Instead, they say they will promote safety and comfort.

General Motors Corp., whose sheer dominance of the market crystallizes U.S. taste in autos, announced a few days later that it would import the British Vauxhall Victor and Germany's Opel Rekord, both made by GM subsidiaries. The announcement came barely six months after GM's President declared that the company had no interest in importing European cars.

What happened?

First, note the chorus of complaints about traffic and safety problems, complicated by large, powerful cars. Note also that for two years now, U.S. automakers have had to revise their sales forecasts downward (also, auto exports are dropping).

Finally, no one can miss seeing the increasing fleet of small foreign cars in the U.S.A. Sales rose steadily between 1948 and 1954, from under 20,000 to 30,000. Then came surging growth, largely paced by the fast-selling Volkswagen. In 1955, 51,658 foreign cars were sold, and 1956 saw the total soar to almost 100,000. Imports so far in 1957 are up sharply, and sales may pass 150,000 by December.

British cars are enjoying new successes (including Ford's imports from its British subsidiary); Renault of France, Fiat of Italy, and Sweden's Volvo have launched major marketing efforts. Studebaker-Packard will soon be selling more Mercedes cars. And Volkswagen rolls merrily along, with demand far ahead of supply.

GM's decision seems to confirm that the small car has arrived in the U.S.A. to stay. But beyond that, the questions arise. How will the General Motors experiment work? How many Americans will reshape their tastes to smaller, less expensive cars? Will there ever be a small car made in the U.S.A. with mass domestic sales, as well as greater export potential? How will the powerful autoworkers union react to increasing imports by American manufacturers of cars made abroad? ●

GERMAN member, Frau Elisabeth Haub, heads candy company, with retail outlets and some 8,000 employees.

BELGIAN pharmacologist, Mme. Georgette Hubert, runs laboratory of LADEP, S.A., and is also a director.

FRENCH executive—head of a Paris tool company—is Mme. Yvonne Foinant, who founded group in 1945.

DUTCH businesswoman, Dr. Vergeer-Goudsmit, listens. Netherlands has 20,000 women heading businesses.

BRITISH accountant Miya Simmonds is partner in London firm. Newest FCE chapter is in Canada.

The Lady Managers Have Their Say

Digested from BUSINESS WEEK, June 8, p122

The idea that the world of management is a man's world was badly shaken several weeks ago at Bad Godesberg, Germany. More than 300 female executives, members of the Femmes Chefs d'Entreprises Europeennes, gathered there for an international congress—to compare notes and discuss the problems of the lady manager.

They came from France, Germany, the Netherlands, Belgium, and Britain — countries where some 4½-million businesses are owned and managed by women.

And it was not a question of beauty salons and tea shops: The ladies represented virtually every industry from cigar factories to heavy construction.

In 1945, Mme. Yvonne Foinant, owner of the Paris tool firm of Edmond Foinant, stumbled over the statistic that France had 3.7-million female employers, compared with only 4.2-million male. Yet women were not represented in trade groups and public commissions in anything like this 44% proportion. So, she founded the Femmes Chefs d'Entreprises to promote recognition of her sex.

Soon, women were represented in some of the most influential French organizations. And FCE chapters were set up in other countries—Belgium, Holland, Britain, Germany and, most recently, Canada. Generally, the FCE stresses different aims in different countries.

In England, women suffer the

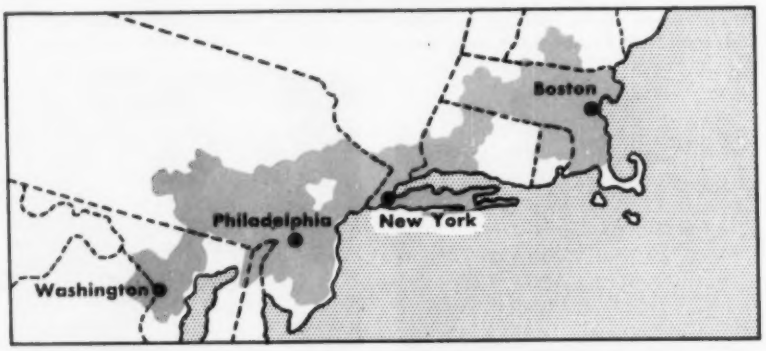
least from discrimination in jobholding. Yet an FCE member was recently turned down, because of her sex, for membership on the Birmingham Stock Exchange. The group made such a fuss that it is not likely to happen again. Perhaps the major worry for British—and, to some extent, Dutch—lady managers is the tax treatment of their income.

While the FCE chapters in these countries fight against discrimination, the French and German chapters concentrate on training their members for public life.

Most of the women at Bad Godesberg were more than 40; many had inherited a business when a father or husband died. All said they employ men but do not seem to have difficulty bossing them. Beyond that, a *Business Week* reporter found "no information on the ages of the lady bosses or on the amount of capital they represent". ●

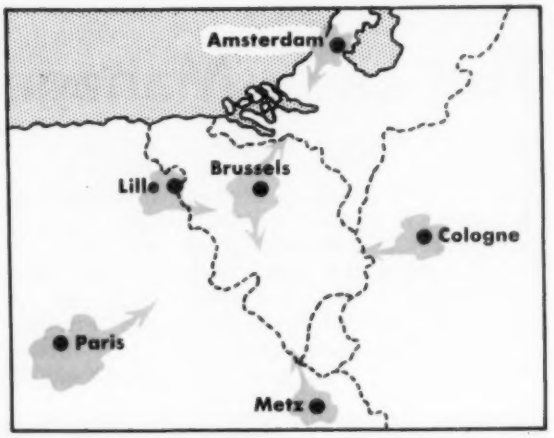
Planning for the Super-City

A new urban form is appearing — critically important to managers and marketers, and certain to change their grandchildren's mode of living. Watch it grow.



In the U.S.A., they call the colored area above "Megalopolis"—an almost solid, 960-km. urban belt containing nearly 20% of the U.S. population.

In England, several growing population clusters may link up to form another giant Megalopolis.



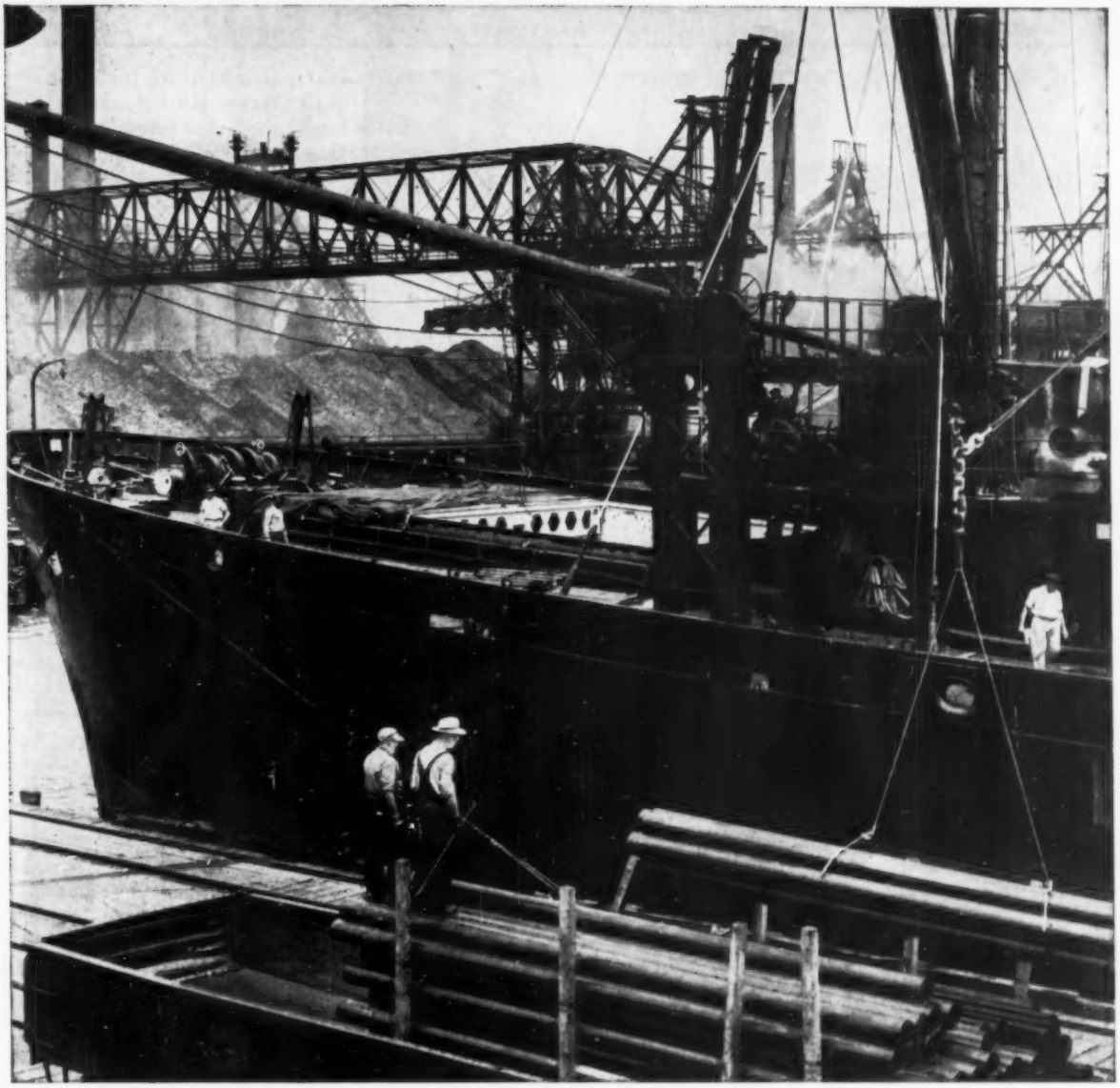
On the Continent, an international "super-city," with high population density, may be evolving.

A new form of urban life is appearing in the Western world. Call it what you will—the super-city, conurbation, Megalopolis—it is a trend no one can ignore.

To better understand the trend, the U.S.A.'s Twentieth Century Fund has launched a study of the new urban form. French political scientist Jean Gottmann will head the study of "Megalopolis, U.S.A." —the name he has given to the almost solidly-urbanized rectangle stretching from Greater Boston to Greater Washington along the U.S. eastern seaboard (map, above). The area is the world's most important concentration of production, wealth, and commerce; already, it seems to be "gaining the characistics of a single city."

Gottmann believes the trend is worldwide. Like it or not, this super-urbanization has come to stay.

In the United Kingdom, similar continuous cities and industrial suburbs are coalescing into greater and different wholes; one day, the fast growth of London northward and Birmingham southward may meet in one giant complex. On the Continent, Paris and the industrial north is an increasingly contiguous area, and so are the complexes along the coast of Holland, Belgium, and France and eastward to Cologne. ●



From the Steel Mill right into the Ship

Bethlehem's great Sparrows Point plant in the Port of Baltimore, U.S.A., is the world's largest steel mill located on tidewater. Products for export can be loaded at this plant directly aboard ship—an arrangement with twin benefits to the purchaser.

First, it eliminates the delays caused by long overland freight hauls.

Second, it minimizes the possibility of damage by greatly reducing the handling required.

Our Sparrows Point plant has served the export market for years. With its tidewater location, it can save days or even weeks in the handling of your order for steel. Bethlehem Steel Export Corporation, 25 Broadway, New York 4, U.S.A. Cables: "BETHLEHEM, NEWYORK."

Bethlehem supplies steel to world markets in all forms, including

BARS ★ ALLOY STEELS ★ TOOL STEELS
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In the Belgian Congo (above, left) and in Holy Mecca, U. S. soft drinks are as well known as in New York or Kalamazoo. Competition is fierce in . . .

Battle of the Bottlers

Digested from BUSINESS WEEK, June 8, p181

THERE is a fierce world-wide battle going on among the bottlers of "colas," soda, and fruit drinks—anything that is carbonated, colored, and "refreshing."

Some of the stiffest competition is coming from bottlers of locally-produced concentrate. But the U.S. exporters, operating internationally through franchised bottlers, have set the pace in quality control and marketing. And they are competing just as vigorously among themselves.

In dollar volume, industry people rank Coca Cola, Pepsi Cola, and Canada Dry as one-two-three in the field. Coca Cola now has 455 bottlers outside the U.S. and Canada, as compared to just 1,100 at home. The company is signing an average of 20 new ones a year.

Pepsi Cola has 162 bottlers outside the U.S. and Canada—over half of them signed since 1950. Canada Dry has 76 overseas plants. Orange Crush, though its volume is lower, claims between 125 and 150, and Seven Up is another contender. There are 15 or so smaller U.S. companies in the field as well.

Here is how a franchise works: The soft drink company picks out a likely market. Then it tries to locate a reliable, capable businessman who can finance and operate a local bottling plant—and plenty of local businessmen, attracted by the potential profits, approach the companies directly. Depending on the size of the market, the plant can cost anywhere from $50,000 to $1-million. The company will help him out with production details and advertising, but the local bottler is expected to "run his own show." The sole interest of the U.S. company is in selling concentrate to the franchised bottler.

Bottling operations are much the same around the world. Merchandise techniques are similar—heavy use of newspapers, radio and television, theatres, outdoor signs. Advertising slogans are given the same colloquial "ring" if possible, but translation presents a problem.

In the soft-drink industry, sheer sales volume above the break-even point makes the big money. However, there are reasons for limiting territories. Transportation is a costly item, and it is important to cut down loading and traveling time. Also, company policy differs. Pepsi Cola, for instance, prefers big-volume operators covering broad territories. Coca Cola prefers smaller operators—and that partly explains why "Coke" plants outnumber "Pepsi" plants.

Price wars are not uncommon—especially after a currency devaluation. With the cost of concentrate and bottling machinery going up, profits can be caught in a powerful squeeze.

Despite restrictions, there always seems to be room for expansion. Here are places where the business is expanding fastest:

—In Europe, West Germany is the hottest battlefield. British sales are booming too.

—In Latin America, Venezuela has about 100 bottlers—and production has increased 10 times in 10 years. In Argentina, soft drinks are overtaking wine in consumption—though wine is cheaper.

—In the Middle East, business is thriving. Bottlers are making 16% to 25% on sales.

—In Asia, a vast new market is opening in Japan. ●

Africa Retailing—U.S. Style

"We have been strongly influenced by U.S. retailing," says Director Hans Saenger of South Africa's Greaterman's Stores. "And we have the advantage of being able to adapt methods that have proved successful."

Greaterman's—with 108 stores in the Union and the Rhodesias—already uses complete self-service in its food departments, and is now testing self-service for soft goods. As expected, pilferage increased somewhat, but nowhere near as much as sales. "Customers buy more when they can handle the goods," Saenger explains.

There are other reasons for self service too. Labor costs are rising, and fewer young people are interested in retailing careers. So there has to be more efficiency.

Greaterman's is also "sold" on modern design. When the company made plans for its new Payne Bros.' store in Durban, Saenger hired a U.S. architectural firm (Copeland, Novak, & Israel) to design the interiors. Furniture and fixtures were then manufactured by South African craftsmen from detailed blueprints. And Payne Bros.' is South Africa's first with zoned air-conditioning.

When the store was opened, Greaterman's put on a highly successful U.S.-style promotion featuring local dignitaries, London's top fashion model, souvenirs, even a prefab house on the roof.

As with most department stores,

(Story continues on p 21)

When you buy a diesel engine be sure you get all three:

1. DESIGN

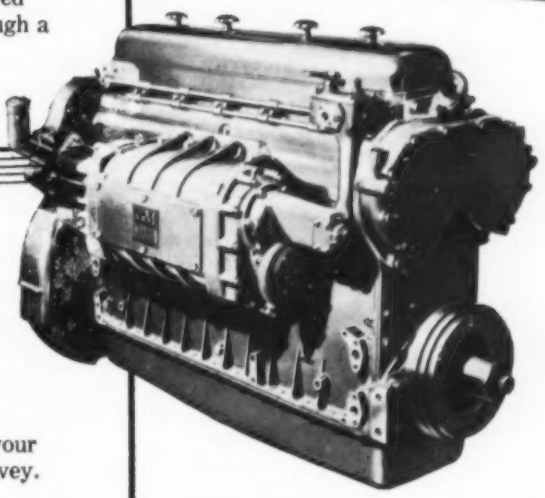
When you specify "GM", you know you're getting the very best in modern Diesel design. GM engineers have reduced Diesel weight by more than 90%... have improved its performance by changing from four to two-cycle design... and have devised a highly efficient *unit* injection fuel system that insures cleaner, more economical fuel consumption. GM engines are engineered for starting by electric, hydraulic, inertia or air systems.

2. SERVICE

Because of their clean, simple design, GM Diesels run for thousands of hours between overhauls, with downtime reduced to an absolute minimum. But when service *is* needed, it's quickly available through a world-wide service organization with competent, on-the-spot service by factory-trained personnel.

3. PARTS

No matter *where* they're needed, no matter *when* they're needed—low-cost factory-engineered parts are quickly available—through a world-wide distributor-dealer organization.



No wonder GM Diesels are serving as original or replacement power plants in more than 1000 different models of construction, mining, drilling, generating and marine equipment built by over 150 manufacturers. For an analysis of how this modern Diesel can step up production and cut costs on your job, ask your GM Diesel Distributor for a free power survey.

General Motors Overseas Operations

Division of General Motors Corporation

1775 BROADWAY, NEW YORK 19, N. Y., U. S. A.

For additional details, contact the GMOO representative nearest you.

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MEXICO, Mexico, D.F.
NEW ZEALAND, Wellington
PAKISTAN, Karachi
PERU, Lima
PORTUGAL, Lisbon
SOUTH AFRICA, Port Elizabeth
SPAIN, Barcelona
SWEDEN, Stockholm 20
SWITZERLAND, Bienne
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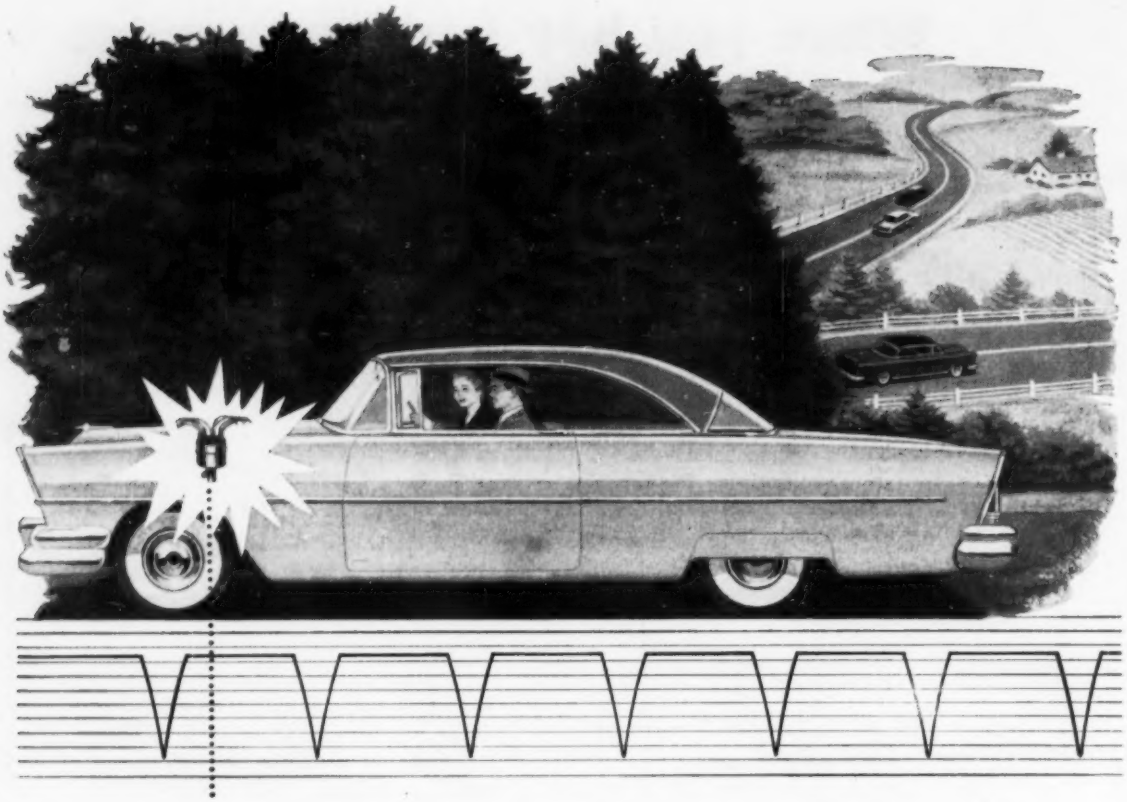

12,000 'Pulse Beats' Per Mile

100 times a second as you drive, tiny but tough Mallory tungsten contact points must "make and break" to control the flow of high-voltage current to your spark plugs.

HOW LONG has it been since you had trouble with the distributor points in your car? Probably a good many thousand miles. Yet every mile you drive, those little contacts meet and separate 12,000 times as they work to help provide the clean, "fat" sparks vital to smooth, powerful engine performance.

The long, trouble-free service of the Mallory tungsten contacts so widely used in automobile ignition systems is the result of more than 30 years' experience in electrical contact design and metallurgy.

They are "cousins" of other Mallory contacts that have an important place in all kinds of electrical equipment—from the toaster in your kitchen to the giant circuit breakers in the power-house. To meet the diverse requirements of such equipment, Mallory has developed many special alloys and powder metal compositions. Mallory's unique metallurgical skills have also set standards of quality and uniformity in resistance welding materials and techniques . . . as well as in the production of high density metals for shielding radioactive substances and for high-speed gyroscope rotors.

Mallory activities and achievements in specialized metallurgy are paralleled in two other important areas —electronics and electrochemistry. Leading manufacturers in these fields count on Mallory precision components to improve their product performance . . . without increasing their costs.

In Europe, Mallory special contacts are available through Johnson Matthey Co., Ltd., Hatton Garden—London, England.

P R MALLORY & CO INC

MALLORY

SERVING INDUSTRY WITH THESE PRODUCTS:

Electromechanical • *Resistors, Switches, Tuning Devices, Vibrators*
Electrochemical • *Capacitors, Mercury and Zinc-Carbon Batteries*
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P. R. MALLORY & CO. Inc. INDIANAPOLIS 6, INDIANA

Greaterman's sells merchandise from all over the world. Most foreign goods are bought through the Intercontinental Group of Department Stores, a mutual purchasing organization with headquarters in Switzerland. Each member—one to a country—acts as purchasing agent for all.

Some of Greaterman's stores do up to 60% credit business. Customers can have their choice of free 30-day credit, extended six-month credit, or installment payments (hire purchase) on a legal repossess basis.

Greaterman's next project will be a suburban shopping center—with plenty of parking space—outside Johannesburg. ●

How to Judge Advertising Copy

"The consumer is not a moron. She is your wife. We must never insult her intelligence."

This advice to marketing men comes from David Ogilvy, of Ogilvy, Benson, and Mather, the U.S. advertising agency. The rules used by the agency's copywriters may help you judge good copy—or to write better copy for "your wife" or for your industrial customers:

—Don't expect people to read leisurely essays. Go straight to the point.

—Avoid analogies — such as "just as."

—Avoid superlatives, generalizations, platitudes. Be specific and factual. Be personal, memorable, "as if the reader were sitting next to you at a dinner party."

—Try not to be a dull bore. The average woman reads only four advertisements in the average issue of the average magazine. If you want your advertisement to be one of them, write interesting copy. But tell the truth.

—Humorous copy does not sell.

—Write sentences of less than 12 words. Use at least 14 references to people in every 100 words. Use testimonials.

—Put captions under all your illustrations.

—Give the reader useful information. Don't be afraid to write long copy, if necessary. (*Times Review of Industry, June, p*11)

▶ FINANCIAL DIGEST

Robert Garner, president of the International Finance Corporation, clearly stated months ago the investment policy of the new World Bank affiliate (MD, January, p15).

The first consideration: experienced management. And it was strongly implied the first investments would be in solid industrial ventures—with more risky projects coming later. Some observers even predicted the first partner—a German company operating in Latin America.

When the announcement was made in June, IFC performed as predicted. The company is Siemens-Schuckertwerke A. G.; the country, Brazil. The project: expansion of Siemens do Brasil's facilities for making heavy electrical equipment.

Here are details of the investment:

IFC gets debentures at 6% interest, with maturity in 15 years and amortization beginning at the end of the eleventh year. The notes are redeemable, with no guarantees.

In addition, IFC has a 15-year option to convert the debentures into company shares, at par and at the current exchange rate (approximately 73 cruzeiros to $1).

When (and if) the investment proves profitable, IFC plans to sell its debentures and stock option, either together or separately. Siemens gets first refusal on the option. IFC, remember, is forbidden by its charter to own common shares; the company's goal is to convert its $92-million bankroll into a revolving fund.

Also note this background. The capital market in Germany is tight, and Siemens already has a substantial expansion and modernization program underway. Company officials say the Brazilian project would have been impossible without IFC equity capital. Now that IFC has broken the ice, look for more of its capital commitments.

Unlike its more adventurous offspring, the World Bank is a conservative institution that requires government guarantees for its loans.

Its lending in the new fiscal year that began July 1 will probably top last year's level of $400-million. No change is expected in the Bank's policy of "no credit" for countries where the financial situation is considered unsatisfactory.

Look for the Bank to pay closer attention to Africa.

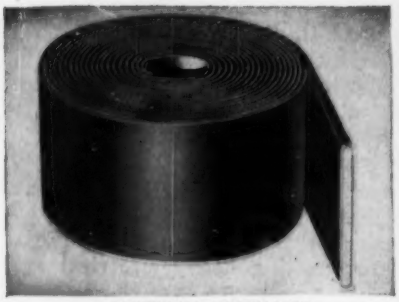
●

A new kind of exclusive—and expensive—investment advisory service is operating in New York. It seeks only 25 subscribers, 10 of them foreign, at $3,000 yearly. Against that fee, the service will offer three types of complete "economic and financial profiles"—at $2,500, $1,000, and $500—and will also take on studies at a subscriber's request.

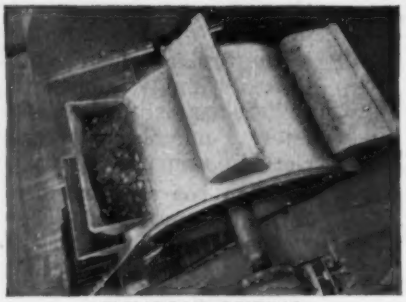
Can any investment advice be that good? The new service, called Basic Economic Appraisals Inc., thinks so. The founders are well-known consultants, and they say they are dissatisfied with the kind of research available today.

What kind of studies? BEA will study broad investment situations (such as the future of titanium producers, or a foreign development project), and more limited subjects (the outlook for a specific transport aircraft, or a current stock market situation).

Bulk Materials Handling Systems



CONVEYOR BELTING



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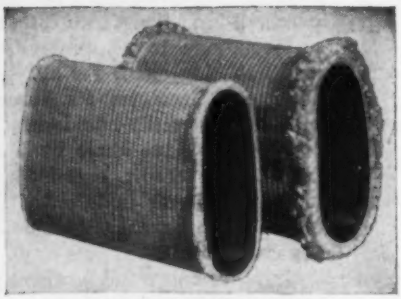
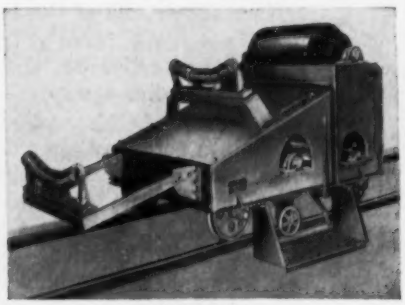
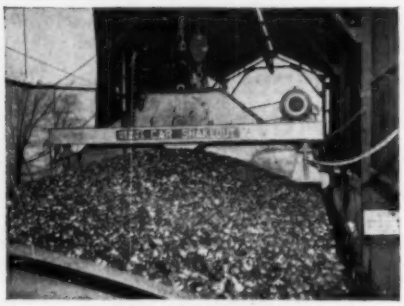


MONARCH FIRE HOSE

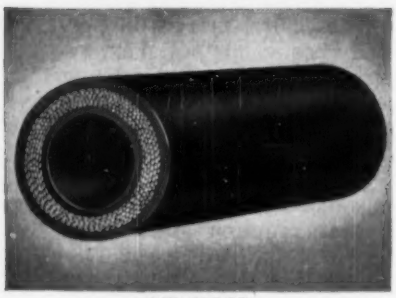
ENGINEERED CONVEYORS



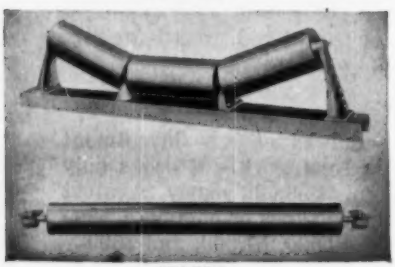
TRIPPERS



CAR SHAKEOUTS



AIR HOSE



IDLERS

HEWITT-ROBINS MACHINERY PRODUCTS. A complete line of specialized machinery for conveying, screening, sizing, elevating, distributing, blending, and storing loose bulk materials of every description.

HEWITT-ROBINS RUBBER PRODUCTS. A wide range of rubber conveyor belts, transmission belts, industrial rubber hoses, and molded rubber products.

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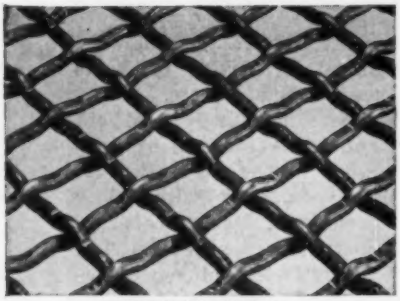
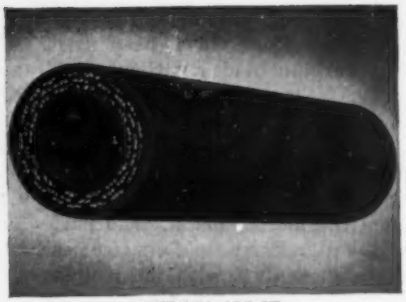
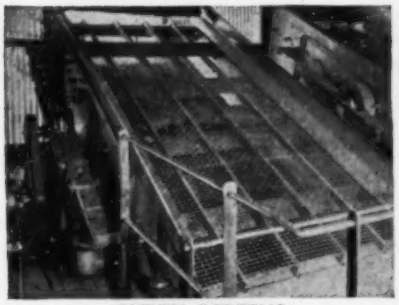


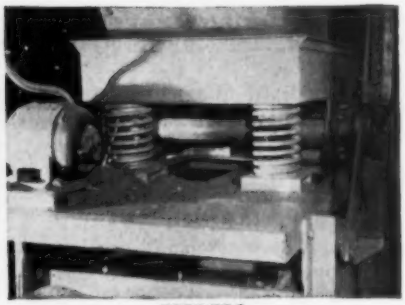
SCREEN CLOTH



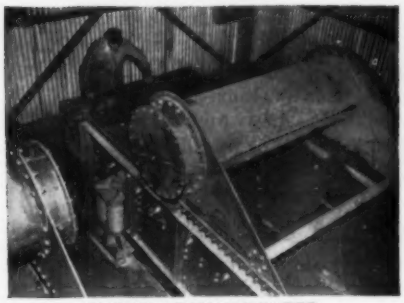
STEAM HOSE



GYREX SCREENS



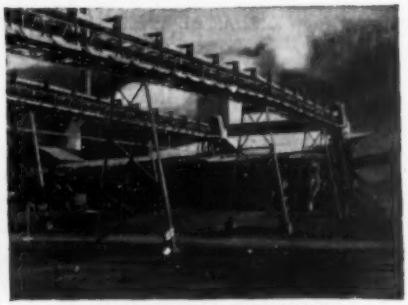
FEEDERS



ELIPTEX DEWATERIZER

PINCH VALVE HOSE

STACKERS



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INDUSTRIAL RUBBER PRODUCTS

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Now: Castings as Strong as Forgings

Digested from PRODUCT ENGINEERING, June, p170

A NEW TECHNIQUE, using anodized aluminum molds, is turning out castings with almost all the physical properties of forgings. So far the usual casting alloys—based on steel, cast iron, magnesium, and aluminum—have proved practical.

The process differs from sand casting in that it uses a metal mold. Also, the controlled metal feed rate and cooling pattern differ from permanent mold casting. Better properties result throughout the casting, and internal defects such as porosity and shrinkage are eliminated; surface defects are also no problem.

There are no inherent limitations to the size of castings that can be made. But shape is somewhat limited. The use of metal molds leads to shapes similar to those produced by forging or permanent molds. Complex external shapes present no problems; undercuts and irregular surfaces are possible by using split or multiple molds. Internal cores can cause trouble; part design must make provision for extracting the core. Coring of holes is not recommended as freezing (solidifying) metal sets up stresses that may tear or warp the casting.

While not all casting alloys have been tried, and little work has yet been done on copper base alloys, no difficulty has been encountered with light alloys, steels, and superalloys. These are some of the materials tested:

Cast iron was tried first and has proved most successful.

Carbon and stainless steels also cast well. Austenitic stainless is more suitable than martensitic or low-nickel types.

Magnesium alloys are uniformly satisfactory, including those for high-temperature applications with zirconium, thorium, or other rare-earth additions. The rapid cooling action prevents segregation, or migration and agglomeration of the alloy additions.

Aluminum alloys can be cast readily.

Nimonic and similar high-temperature alloys have been cast into turbine blades without difficulty.

Here's how the process works:

The high thermal conductivity of aluminum controls both the direction and rate of heat transfer from the molten metal. The part of the aluminum mold that comes in direct contact with the molten metal is deeply anodized. This anodized layer has a melting point of over 2050°C.—easily withstanding melting temperatures of the casting alloys.

The anodized film momentarily checks the flow of heat from the metal being poured, keeping it from freezing too soon. The metal that is first poured into the mold freezes first. Controlled pouring produces progressive solidification of the part from the bottom up; the last to freeze is the riser. Pouring time, however, seldom exceeds 30 seconds, even for large parts.

The solidification process results in a dense casting, while the high cooling rate produces fine grain. Both are characteristics that contribute to the improved mechanical properties of parts produced by this process.

Test bars machined from both thin and heavy sections of castings give higher strength and ductility compared with other casting methods. Mechanical properties permit smaller section size, particularly important in applications requiring high strength-to-weight ratios. These are some other advantages:

—Uniformity of properties from casting to casting, through use of the same mold to produce many castings.

—Accurate reproduction of detail. Machining time can be cut substantially.

—Casting production rates are high, requiring less skill than is needed in other casting processes.

There are limitations.

Extracting cores from the casting, and castings from the mold, is difficult. Also, a mold has to be developed for each part, and the cost of this pattern-and-process development may approach the cost of making forging dies. ●

Tough Personality for Glass

A new glass—with many exciting properties—is added to the list of structural materials.

Digested from CHEMICAL WEEK, June 8, p64

Glass can be defined as a supercooled liquid; it is a liquid that looks and behaves as a solid. But give it a crystalline structure and you have a new engineering material with remarkable properties. That is what Corning Glass Works (Corning, New York, U.S.A.) did in making "Pyroceram" (MD, July, p8)—the trade name of a new group of materials the firm hopes will find markets in fields as wide apart as architecture and jet-engine manufacture.

Here are some properties of Pyroceram:

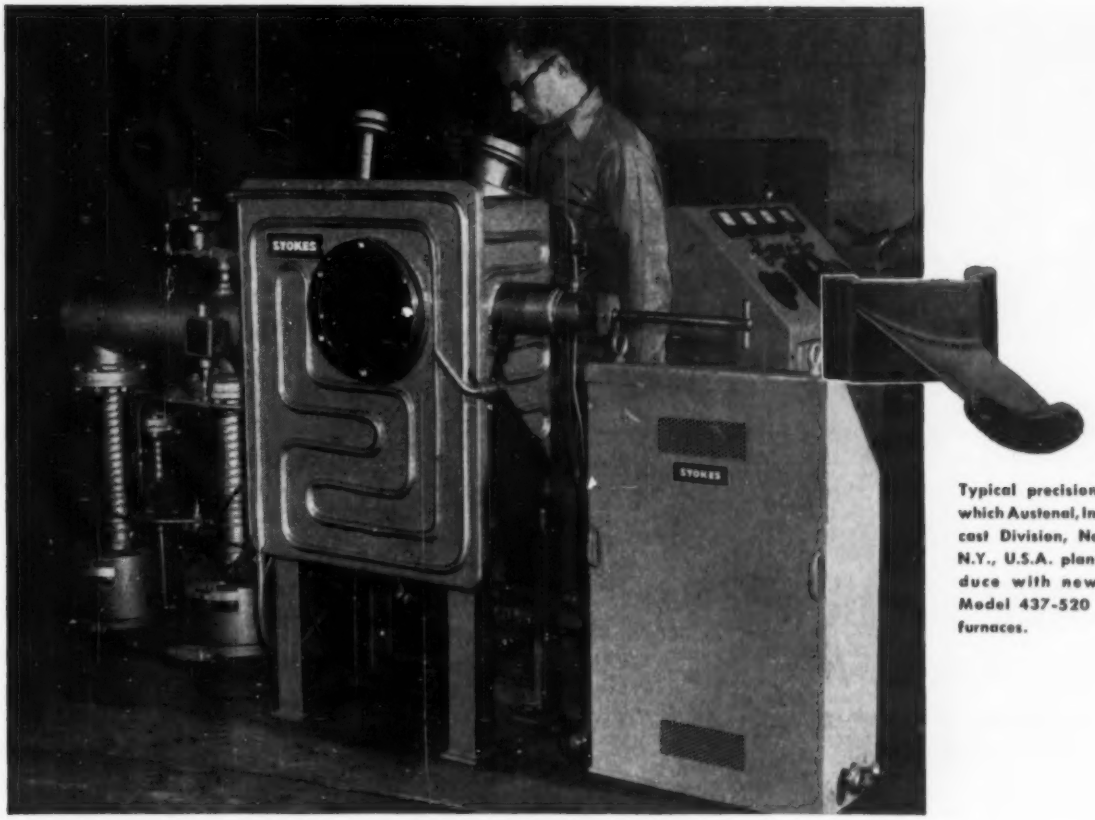
Flex strength ranges up to 5,600 kilograms per square centimeter, depending on type.

Harder than fused silica, stainless steel, cast iron, titanium. Some 27 times harder than plate glass.

Softening temperature up to 1350° C. Pyroceram test bars stay rigid while a steel bar sags, and copper melts.

Acid resistance of one type is nearly the same as borosilicate glass; more resistant to alkali.

A Pyroceram is made by adding one or more nucleating agents to a special batch of glass that is formed into the desired shape, then treated in a high-temperature furnace. The nucleating



Typical precision casting which Austenal, Inc., Microcast Division, New York, N.Y., U.S.A. plans to produce with new Stokes Model 437-520 vacuum furnaces.

A significant forward step for Vacuum Metallurgy

New Stokes precision casting furnaces pave the way for important advancements in the science of putting metals to work.

The potentials of vacuum casting of familiar metals and special alloys can now be explored—on a research or production basis—with these new Stokes' low-cost "package" units.

Capable of melting and pouring single casts of up to 30 pounds, under vacuums as low as 1 micron or less—these furnaces incorporate operating features specifically requested by precision casters. Units are now in operation with charging and mold locks for semi-continuous production.

If you are planning to investigate the challenging potential of modern vacuum metallurgy—plan, too, to take advantage of the undisputed leadership in equipment and experience which Stokes can apply to your problem.

Many manufacturers throughout the world profit by Stokes' unparalleled experience in serving industry as designers and builders of industrial machinery and process equipment. Stokes offers a diversified line of precision-engineered, cost-saving production equipment . . . including Vacuum Furnaces, Systems and Pumps; Chemical Process Equipment; Powder Metal Compacting and Plastic Molding Presses; Pharmaceutical Tabletting Machines and Accessories. Stokes also offers extensive research laboratory and customer advisory facilities. Your inquiry is invited.

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STOKES

agent induces the glass to crystallize—somewhat as a raindrop forms around a dust particle.

Corning has made more than 1000 experimental types of Pyroceram, and has developed methods of controlling the growth and chemical composition of the crystallites so that end-properties can be varied over a wide range.

Pyroceram can be formed into large or complex shapes. This is done on standard glass-forming equipment before the final step of crystallization. It is therefore adaptable, Corning says, to mass production, and can be pressed, blown, rolled, centrifugally cast.

Because raw materials are not costly and processing is no problem, Corning foresees no great marketing problem. It expects the cost of Pyroceram to be somewhat more than that of glass, "but less expensive, for example, than stainless steel."

Corning predicts that the materials will find their way into architecture (especially for curtain walls), jet engines, and piping in the chemical and oil-refining industries. It may even go into homes as a range top—with heat supplied from an electric conducting coating.

Some questions about applications have not yet been answered. For instance, can Pyroceram be foamed? Can it be fused to other materials? Also load-bearing qualities will have to be evaluated. Here, architects will want answers.

Corning does not expect Pyroceram to replace other materials—such as alumina or other high-temperature ceramics—but rather to expand the spectrum of materials in use. Enthusiasts tell you not to be surprised as glass begins to move into new fields now considered out of its domain. ●

The well known

BLUE BIRD

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is now available with motorised or electric vacuum attachment

Extremely compact and easily operated in confined spaces this new BLUE BIRD can be used with or without suction as required. Available with 8. C.Cs. Petrol engine operating 4/5 hours on one filling or ¼ h.p. Electric motor, all voltages. Suction 65 cu. ft. per minute. Dust bag approx. 2½ cu. ft. A 9ft. extension for wall or shelf cleaning is also available if required.

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Epoxy Castings Cost Less Than Metal

Relatively large and complex cast epoxy resin parts can be made with minimum tool expense and without costly molding equipment, reports *Product Engineering*. This is especially true of short-run production. Epoxy castings have low shrinkage, good chemical resistance, and high dielectric strength. But their cost is higher than phenolic and polyester casting resins.

Two types of hardener are available: (1) acid hardeners which must be cured at an elevated temperature, and (2) amine hardeners which cure at room temperature.

These factors influence design of epoxy cast parts:

Steel molds are suitable for production casting.

Draft can often be eliminated. But test several mold designs first.

Steel cores shape internal cavities.

Intersecting passages can be cast by appropriate core design. Internal cavities can also be made by the lost wax method. Curing heat melts the wax core.

Male threads require split molds in most cases.

Embedment of metal fittings is satisfactory, provided temperature changes in service are moderate.

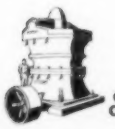
Finishing is unnecessary. (*Product Engineering, June, p*135)

220
NORDBERG RADIAL ENGINES now in service for Aluminum Company of America
22 more NORDBERG units now on order will provide nearly 475,000 TOTAL HORSEPOWER

A total of 220 Nordberg spark fired gas burning Radial engines with a capacity of over 400,000 horsepower have amassed a *total of over 8 million hours of dependable operation* at the Point Comfort, Texas smelting works of the Aluminum Company of America . . . by far the world's largest internal combustion engine power station.

As part of its continuing expansion of aluminum production facilities, ALCOA ordered 22 additional Nordberg units to provide power for a seventh pot line at Point Comfort. This new line will add 20,000 tons to the operation's installed capacity of 120,000 tons annually . . . requiring well over four million kwh per 24 hours.

The 22 additional Nordberg engines will raise the power capacity to nearly 475,000 horsepower, and will be the third expansion of power generating facilities for the electrolytic reduction of aluminum by Alcoa at Point Comfort.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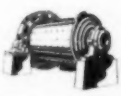
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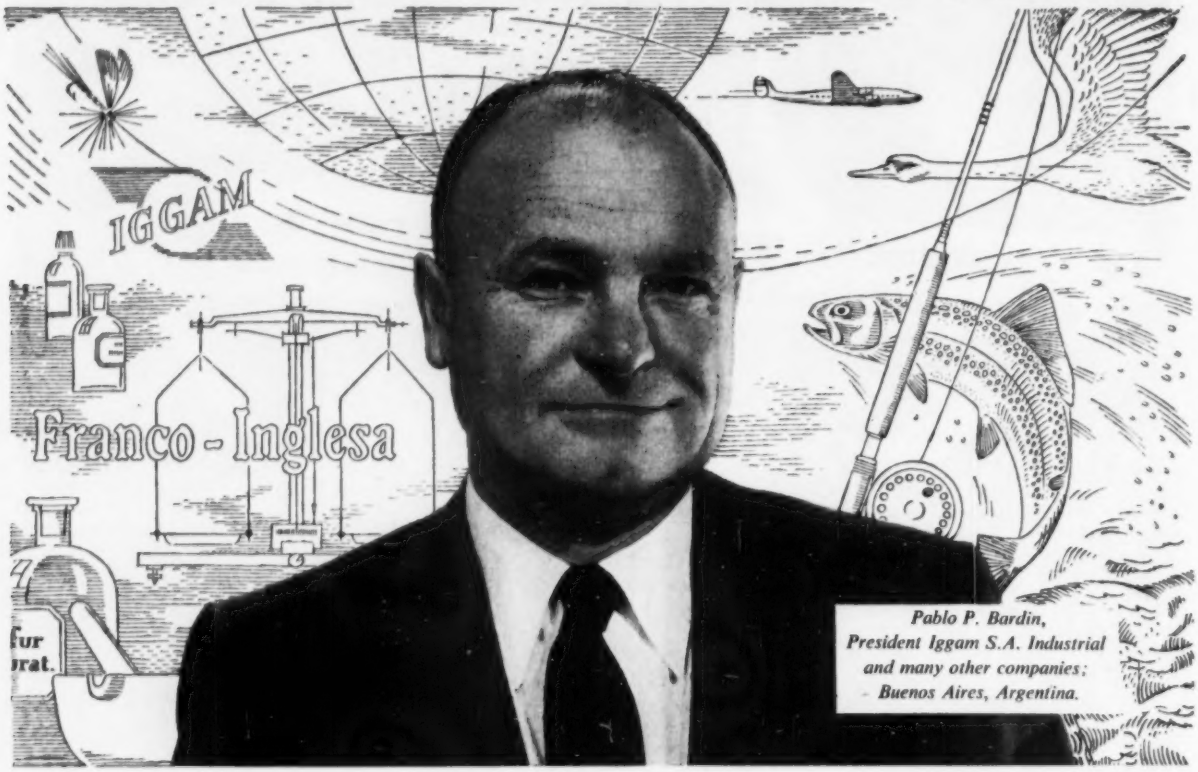

Pablo P. Bardin, President Iggam S.A. Industrial and many other companies; Buenos Aires, Argentina.

He knows a catch from a catch

Quite a force, this tanned, muscular, multi-lingual Argentinian, who spearheads an industrial agglomeration, Iggam S.A.: 2,000 workers, annual turnover of 120 million pesos and a line of products ranging from a(sbestos) to z(inc). Before Pablo ("Polo") succeeded his brother Pierre, Iggam's founder, he had served for thirty years with his father's pharmacy. No ordinary store, this Farmacia Franco Inglesa in the heart of Buenos Aires. It's a national institution whose name is a headache to headaches; 3,300 prescriptions daily. Polo, now 48, figures he could still substitute for any member of the hundred staff. Nature intended him to be the perfect angler; endowed him with the cautiousness which becomes a chartered pharmacologist, the acumen that makes the merchant prince, and the patience of a naturalist. He tests his skill in widely separated waters; from the blue Caribbean to Argentina's great lakes, from Iquique on the coast of Chile to the quiet brook in Switzerland where he casts his fly for his favourite trout. Polo is a great traveller; has two best-selling books to prove it. A third is pending, on the *dorado*, fabulous Argentine fish. He once landed a 30-pounder, had it cast in bronze and gypsum, sent replicas to various museums. Polo likes KLM. Industrialist, traveller, ichtyologist; he says: "Here's a line which has surely made a prize catch of comfort".

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Looking Ahead in Technology

● **BRAZIL now boasts an increasing number of body plants for both trucks and buses.** One small operation, in Rio de Janeiro, has a unique method of making all-metal bus bodies. The bodies are designed so that they can be assembled, like a model airplane, from hundreds of hand-made pieces.

To make the rounded corner pieces, several men hammer out aluminum sheets with a mallet over a rubber-covered piece of wood. It is done by sense of touch alone—no precision instruments are used.

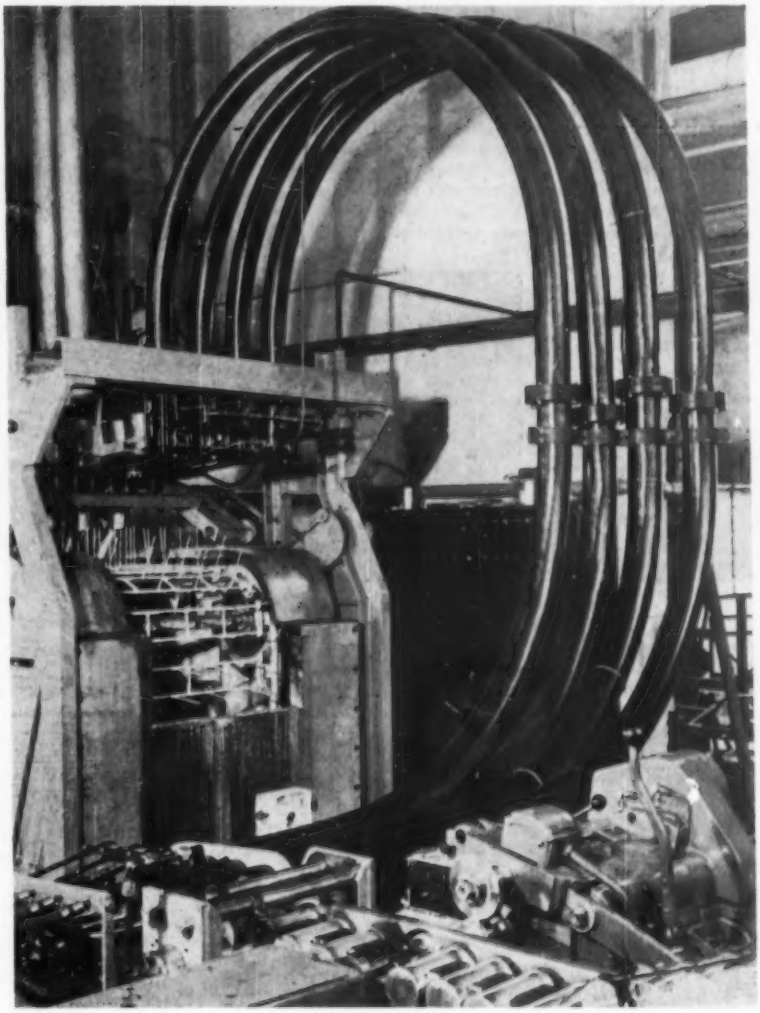
A whistle blows at various times during the day, and everyone drops what he is doing and rushes over to the "assembly line." There workers pick up a frame of a bus body and run it along like pall bearers to fit over a chassis.

The plant turns out two buses a day, but it is reported to compete handily with other companies whose bodies are produced in mechanized operations. (*American Machinist, June* 3, *p*137)

● **GERMAN scientists are studying high-energy fuels based on boron.** The Max Planck Institute for Coal Research (Muelheim-Ruhr) has devised a new way to make diborane—key intermediate in making high-energy fuels. This process forms diborane from aluminum trifluoride, sulfuric acid, boron trioxide and N-trialkyl borazane. A U.S. boron process is shrouded in secrecy, but is believed to involve a reaction between boron trichloride and sodium borohydride. Objective of boron research is to lower process costs and obtain higher yields. The boron fuels hold great promise for powering future high-speed, long-range aircraft. (*Chemical Week, May* 25, *p*48)

● **SOIL ELECTRIFICATION may help improve farm output.** Two U.S. power companies, (Arizona Public Service Co., Salt River Power District), have been experimenting with a lettuce farm in Arizona. Pipe anodes are placed

Story continues on next page



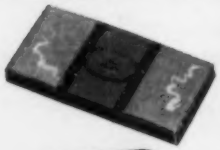
Aluminum Can Debut in Germany

Steamless, rigid aluminum cans are rolling off this completely automatic line at Aluminiumwerke Goettingen Gmbh, German affiliate of Aluminium, Ltd. (Canada). Based on the impact extrusion process, the line takes aluminum slugs and turns them into finished decorated, seamless cans in one continuous operation. The plant's product is being sold in Germany at prices comparable with cans made of tin or black plate. And the process and equipment are simple enough for canners to set up right in the canning plant.

The production line consists of five units: (1) a press to make the can body, (2) a finisher where the can is trimmed to length, flanged or beaded, (3) a degreasing machine and a drying oven, (4) internal lacquering equipment and baking oven, (5) coating and offset printing machines, and baking oven. Cans are handled between machines in plastic tubes (see picture above). They are either blown through the tubes by compressed air or sucked through by a vacuum. The system will handle a wide range of can sizes without major adjustments. The can-making machines can be changed over to a new size in two hours. (*Product Engineering, June, p*206)

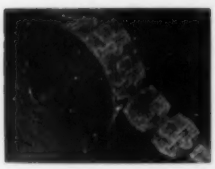
Wrap and label your products to sell and to save on the

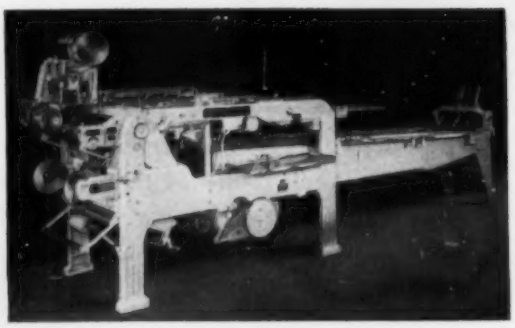
OLIVER Wrapping Machine



One man and the versatile Oliver Wrapper can handle a wide range of package sizes and shapes. Wraps baked goods, paper specialties, textiles, etc. using cartons, trays, U-boards, flat cards, or without supports. Heat-seals or glue-seals package for utmost protection. Quick adjustments keep the unit cost low. Seven models. Speeds up to 50 a minute. Electric eye registers printed wrappers. Roll-Type Labeling System, Cardboard Folder and Feeder, and other features save money every day.

● Oliver automatic Labeler heat-seals a diecut label from a continuous roll (printed by Oliver) to the wrapper. Essential information can be imprinted on label just before it is applied. Imprint items can be changed in a few seconds.





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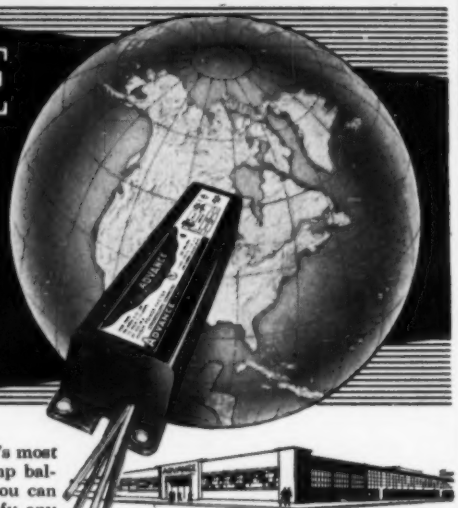

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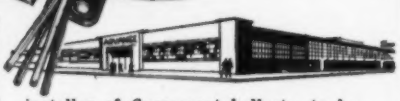

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along one side of the perimeter of the lettuce plot. Cathodes are placed on the other side and electricity passed between the two.

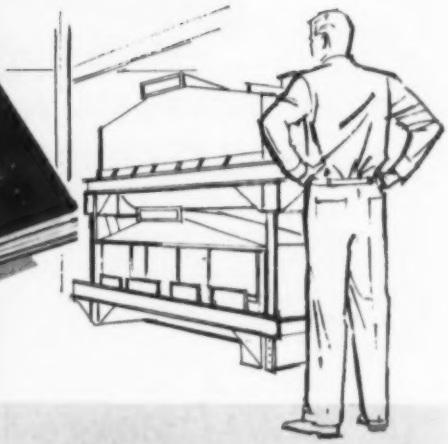
Current flowing through the soil reduces alkali content and increases the soil's permeability; an added benefit has been a drop in damage caused by nematodes. Yield went up 31% after electrification. Right now tests are underway to determine how often treatment should be used. (*Electrical World, May* 27, *p*96)

● **ALUMINUM might replace tin as a coating on mild steel plate** used in food containers, and closures such as bottle caps. Crown Cork & Seal Co., Inc., and National Research Corp. (U.S.A.) are doing the research. The aluminum is deposited by vacuum thermal evaporation. A continuous coater has been built which takes steel sheet from atmospheric pressure to high vacuum where aluminum is applied, and returns it to atmospheric pressure. The end product is claimed to have a corrosion resistance equal to that of tin plate. And the process is potentially cheaper than tin plating. (*Product Engineering, June, p*10)

● **"MOUNTAIN - BUILDING" model machine helps Gulf Oil Corp. scientists learn how and where oil traps form.** It looks much like a child's sandbox and simulates an area 259 square kilometers, 1.6 to 3.2 kilometers deep. In performing experiments, clay is compounded to represent values of strength, density, and other qualities of rock strata. It is rolled into sheets and evenly deposited in the machine. Pressures applied to the sides of the box simulate mountain-building forces. (*Petroleum Week, May* 24, *p*22)

● **THE POLYCARBONATE RACE has another entrant** (MD June, p23). Eastman Kodak Co. of the U.S.A. has been issued patents describing a new process for making polycarbonate plastics, possibly for use as photographic film bases. Meanwhile, Germany's Farbenfabriken Bayer has marketed the first commercial polycarbonate. It is in foil form for electrical insulating purposes, and can resist prolonged exposure to 140°C.

DRYING GRANULAR MATERIALS?



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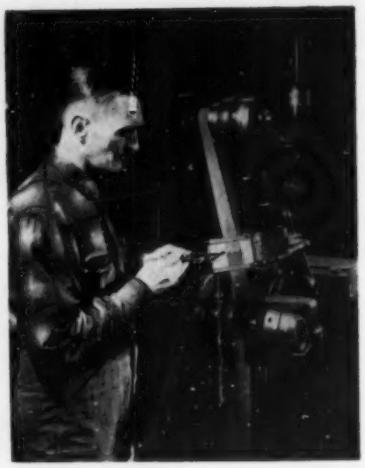
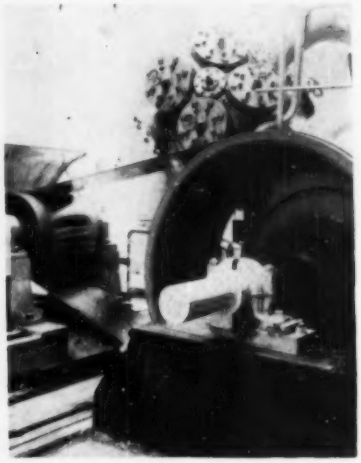


The Swiss Dixylon and . . .



. . . German Extremultus Mean . . .

Longer Life For Flat Belts

Digested from FACTORY MANAGEMENT AND MAINTENANCE, June, p98

Direct drives and unit drives have yet to push flat belts off the industrial scene. There are still many applications where flat-belt drives are very much in order. For one thing, they cost considerably less to install than other types. Maintenance costs, too, can be much lower.

Two new belts should add to the flat belt's potential. One is the Swiss "Dixylon" made by Habisat, Basle; the other is "Extremultus" made in Germany by Ernst Siegling GmbH, Hanover.

Both these belts have a strip

nylon-type polymer bonded core covered with a friction agent to provide a good grip against the pulley. The nylon core is highly elastic and will flex readily around small-diameter pulleys. It is about five times as strong as leather or cotton duck, and can be run at much higher speeds than ordinary leather or cotton duck belts.

Dixylon's core is covered with a nylon cloth impregnated with a secret friction compound. The belt can be spliced and made ready to use in 20 minutes. The top picture (left) shows Dixylon belt being spliced.

The Dixylon is finding its greatest success so far on printing-machine applications. Its low stretch, washability, durability, smooth running and ease of splicing make it desirable.

But Dixylon is not competitive with the best endless high-speed belts where freedom from stretch and elongation are requirements. It will run at high speed, but will elongate. So enough take-up to permit belt tightening must be available.

The Extremultus core is similar to Dixylon's. A layer of duck over the core gives the belt lateral strength. Over the duck on the outside face is a thin layer of chrome-tanned leather which provides a good grip and tough wearing surface. Extremultus has about three times the load-carrying capacity of the belt it replaces.

The belt has made its best showing on various drives in paper mills, particularly cone (or step) drives, where its narrow width (compared with leather) and freedom from stretch make it an almost ideal belt. On cone drives the narrow width permits narrower pulleys, hence more steps within a given over-all space.

The bottom picture (facing page) shows an application on a 515-horsepower motor-driven gas compressor—using a 56-centimeter diameter motor pulley and a 160-centimeter driven pulley with a center-to-center distance of only 173 centimeters. Belt width is 50 centimeters and speed is 2550 meters per minute. This drive has operated continuously since January, 1955, without take-up or belt stretch, according to the manufacturer. ●

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Ore Process Saves Scrap

In just a few years, new direct-extraction installations for processing low-grade iron ores may slash West Germany's huge imports of steel scrap.

The first of two plants has recently been put into service in Salzgitter. It uses the "Renn process," developed by Fried. Krupp Co. The Salzgitter plant was built by eight Ruhr steel companies to service their mills. Annual capacity ranges from 170,000 to 190,000 tons of iron blooms, with a 93% to 95% ferrum content.

The second plant will soon be under construction at Essen-Borbeck, with a projected output of about 430,000 tons annually. Thus by 1960, West Germany will produce some 600,000 tons of blooms, considered the full equivalent of the same quantity of steel scrap. In each of the past two years, the Germans imported 900,000 tons of scrap, mostly from the U.S.A. Krupp spokesmen emphasize, reports the *Journal of Commerce,* that both plants will be economical at present level of scrap prices.

The Renn ore-reduction process uses fine-grained low-quality fuels unsuitable for blast furnaces. The Salzgitter plant processes low-grade iron ores with a ferrum content of only about 30%. The ores are mined locally.

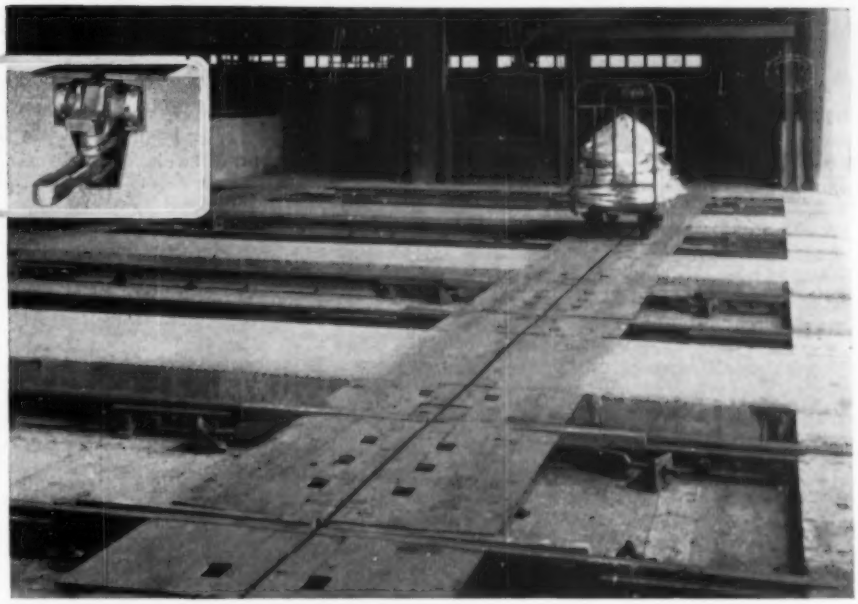
Imported, rather than domestic, ores will be used in the Essen-Borbeck plant. One advantage of the Renn process is that it applies also to acidic ores rich in silicon and ores containing lead and zinc. Ores with a high titanium content cannot be processed in blast furnaces, but can be handled by the Renn process.

The blooms resulting from the Renn process have a carbon content of 0.5% to 1.5% and diameters of from 0.21 centimeters to 2.0 centimeters. Phosphorous and sulfur content depends on the fuels and ores used. They are practically free from slag.

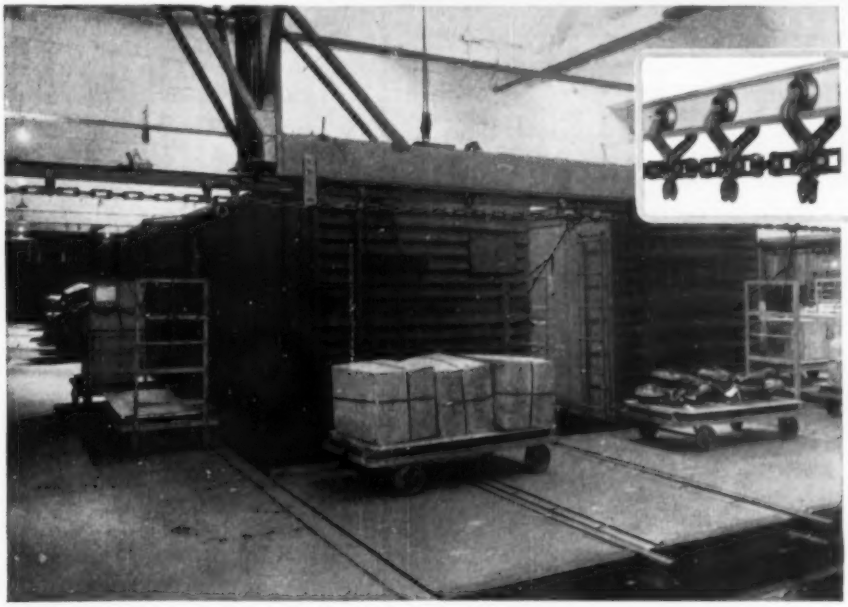
Further processing of the blooms takes place either directly

How mechanized trucking cuts congestion, speeds sorting, handling

LINK-BELT in-the-floor Trukveyor has concealed mechanism, leaves area free of obstructions



Flexible in path layout, this type of Trukveyor easily negotiates horizontal turns and changes in floor elevation. All operating components are out of the way, yet accessible for routine inspection and maintenance. Clean-out section pits permit rapid removal of dirt and debris. In installation shown, railroad cars cross the conveyor without interfering with Trukveyor chain.



LINK-BELT overhead Trukveyor is easily modified to accommodate layout changes

This type is generally used in existing terminals where changes to floor are not desirable. Overhead structure is supported from ceiling or roof . . . occupies no floor space.

System will follow changes in floor elevation, execute horizontal turns and permit disengagement of trucks at any desired point. In installation shown, chain is detached and trucks unhitched to permit passage of railroad cars. Platform drops to track level.

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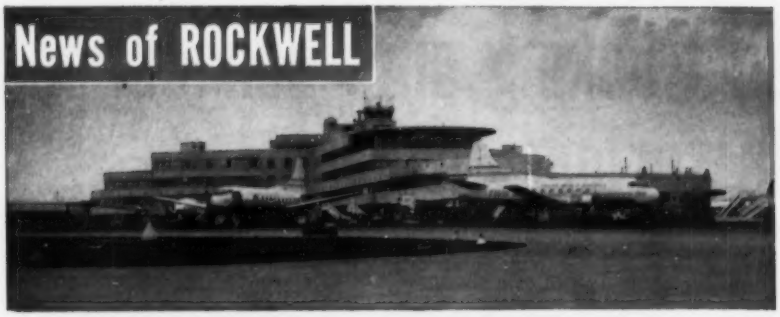
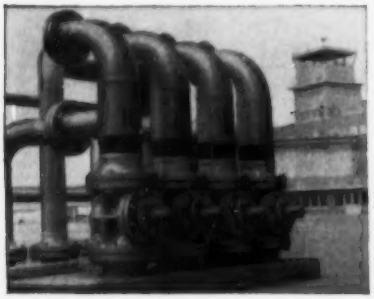


NEW DEVELOPMENTS in air transportation create ever-changing service needs at airports throughout the world. Each air terminal is essentially a service station that must provide precise types and quantities of fuel and lubricants for the newest —and oldest—aircraft. Since safety, accuracy and dependability are of such prime importance, many air terminal operators rely on Rockwell-Nordstrom valves and Rockwell Rotocycle meters for perfect flow control. The aviation industry, like the petroleum, gas and process industries, has learned that the name Rockwell on valves, meters, pressure regulators and a host of other products is their guarantee of highest quality and the finest service.



A NEW IDEA for faster fueling is pipeline service onto the airfield. The manifold (above) of Rockwell-Nordstrom lubricated plug valves controls fuel flow to pits on the field eliminating the need of service trucks. Rockwell-Nordstrom valves are ideal for this service because they shut-off positively with just a quarter-turn. Rockwell-Nordstrom is the world's most complete line of lubricated plug valves.

ACCURATE MEASUREMENT, for either storage or delivery of petroleum products (and many other liquids), insures precise records for cost control. The Rockwell Rotocycle meter shown above stays accurate and trouble-free year after year because the exclusive Rockwell design assures less wear, less repair. The "predetermining" register (at right of meter) automatically shuts off at any pre-determined amount.

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in an electric furnace, depending on phosphorous or sulfur content, or in a blast furnace or a cupola furnace as an intermediary stage.

Such countries as Pakistan, Peru, Indonesia, Union of South Africa, and the U.S.A. have displayed interest in Renn process iron. Krupp finds that even countries now exploiting high grade ores are considering the Renn process—eventually they too will have to draw on inferior ores. Also, installing the Renn process near low grade ores may prove more economical than transporting high-grade ores over long distances. ●

Computer Rations Nile River Waters

An electronic computer is in the middle of one of most complex political and economic puzzles in the Middle East—regulation of the Nile River water for irrigation and hydroelectric purposes. In London this month, an International Business Machines Corp. model 650 computer is busy calculating the ultimate irrigation needs of nations that want the Nile's benefits. It figures locations, size and operation of future reservoirs and dams.

One problem the computer may help solve: Egypt and the Sudan both insist they can use more water than would ordinarily be available. Egypt concedes less than half the water that the Sudan claims it requires.

Some observers believe the computer may establish that much more water will be available for sharing through various projects.

Some factors the computer considers are: Best locations for reservoirs, working arrangements for all possible storage sites, including volume of water to be released in any month.

In effect, the computer is working out the effects of all possible locations and combinations of dams, in all reasonable combinations of water supply and operation. This involves four existing dams, eight or ten proposed dams, and a 304-kilometer stretch of canal designed to reduce losses in a swampy region of the Upper Sudan. (*Electronics, June* 10, *p*22)

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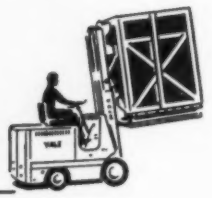

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Planning for The Future

Digested from INGENIERIA INTERNACIONAL INDUSTRIA, June, p38

Look at the layout (right) of the year-old Philips do Brasil lamp and fixtures factory at Sao Paulo. It is clear that this plant was planned with the future in mind. The architect's objective was to build an extremely flexible factory, one that easily adapts to the changing needs and demands of Brazil's economy.

Few plants in Brazil, or anywhere else, are planned to cope with problems at least 20 years ahead. Right now, the plant employs about 400 workers, but it can be expanded to employ nearly 2000. Main features are:

—Production facilities are built around a central "spine" for loading, unloading, and materials storage. It is adaptable for either truck or rail transport.

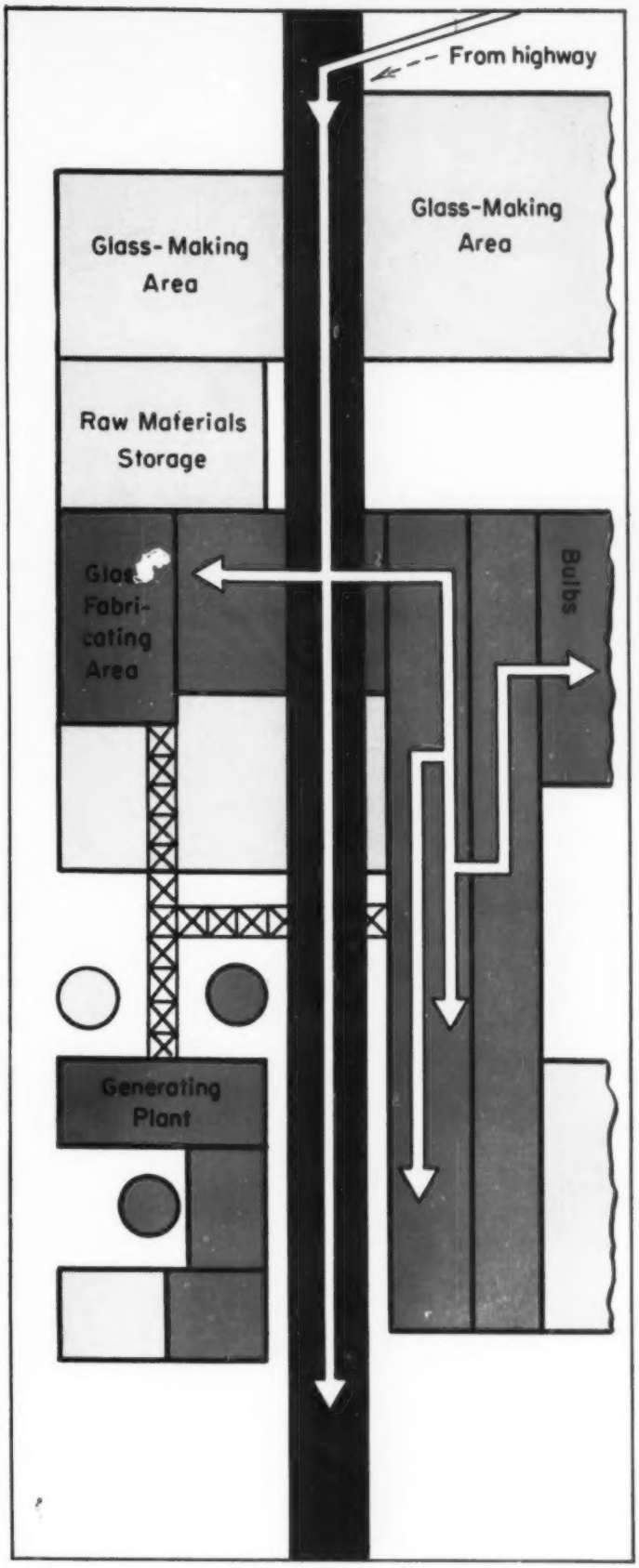
—Facilities for employees designed to keep technicians and skilled workers satisfied—and on the payroll—once they have been hired.

—Both the outer shell of the building and equipment inside can be easily adapted to expansion in any direction.

Philips management claims that factories in Brazil must be able to quickly adapt themselves to new products, different transport. Also, the Latin American factory of the future will need many more of the facilities that make for pleasant working conditions.

The Sao Paulo plant is now running at full capacity—producing bulbs and fixtures for the Philips line of lighting equipment. But plans are being made for the first plant expansion—geared to the sales program and to the Brazilian economy.

Philips engineers standardized



ALL MATERIALS entering or leaving Philips plant flow through a "spinal cord" (black). Present plant is shown in solid color; future expansion will take place in shaded color areas. Arrows show materials flow.

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Now, after three years and thousands of engineering and test hours, here is the best design, the most serviceability, the safest and finest performance ever built into one lift truck.

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Lifting speeds are higher; engine power, tractive effort and gradeability increased, yet control of movement is more precise than ever.

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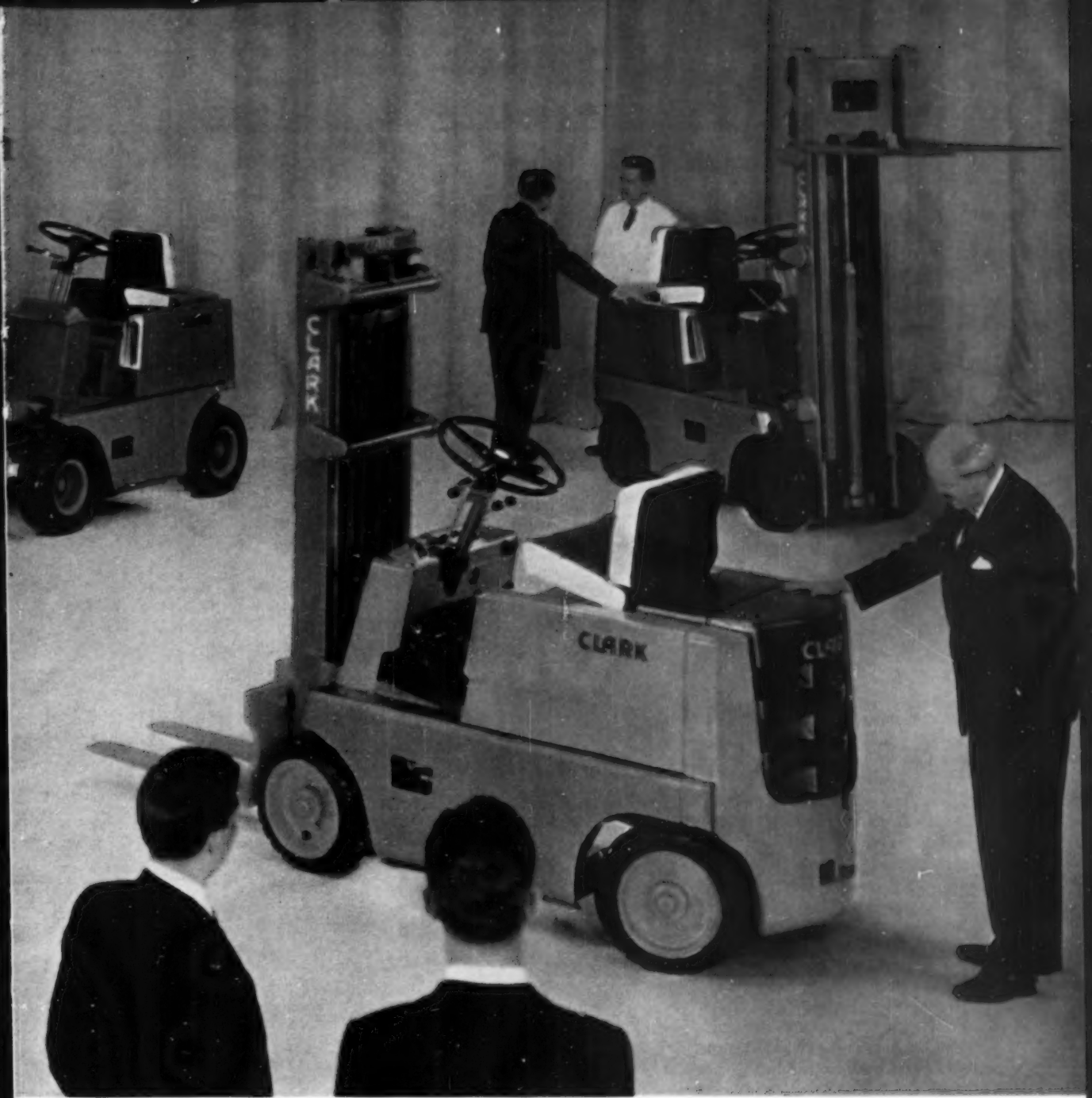

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as much building material as possible. All spans, concrete pilings, metal fixtures, joints—almost everything—were made in specific sizes. Some are stockpiled for future construction.

The construction of the plant's foundation presented a difficult problem. The plant site consisted almost entirely of swamp mud. Philips engineers designed the plant to rest on a foundation supported by more than 2000 concrete piles, each 12 meters deep.

In effect, the foundation is a giant platform on stilts. All piles were pre-fabricated, as were the reinforced-concrete floor sections. Because of the standardized sizes of piles and floor sections, Philips' stockpile of both is waiting to go into any plant expansion that may be made in the future.

The entire projected floor space for the finished project will be 90,000 square meters on a site of 180,000 square meters. "It is our company's fixed rule that we will not exceed 50% building occupation of our grounds," says Philips' architect-engineer, G. J. Wolthuys.

This is his reasoning: In the future, a company in Brazil that does not have good-looking landscaping, small lakes, trees, other facilities for employee lunch hour or off-time enjoyment will soon see its employees turnover climb. Workers in Sao Paulo are just beginning to show that they will move from one factory to another that has more pleasant working conditions. This trend will be well established 20 years from now, Philips maintains. So it has plans for a recreation center, to supplement the present restaurant, medical center (full-time doctor and dentist) and a lake.

The interior and exterior design of the plant is simple and colorful. Brazilians like colorful surroundings, so Philips' architect gave them what they like—yellow tile on the floors, green and white walls. The recreation center will have a series of murals covering the walls. The lighting in the plant is all fluorescent and is designed to provide maximum vision at all times.

The glass-melting furnaces are located in the section labeled "glass factory" on the layout. Raw materials such as sand, soda, red lead, and other bulk materials come into this furnace and glass-making section via truck. (When a railroad spur becomes available, raw materials will come by train.) After the materials are unloaded, they are carried into mixing hoppers by conveyors and on to furnaces by special conveyors on an automatic batch-load basis.

From the furnace rooms, glass tubes will go to the lamp division on a large conveyor system (not yet installed). The movement of materials from the lamp production line to the storage room and from the storage room to outgoing trucks is now handled by pallets and lift trucks. Eventually, a conveyor system will transport the bulbs to storage.

The plant site chosen was one of the most likely because it was close to the Capuava refinery (2 kilometers distance). This assures a cheap continuous supply of gas, fuel oil, and diesel oil. The site also has plenty of water. Sao Paulo Light & Power Co. has transmission lines going into Philips' plant for general electrical uses. But the company installed its own power station to guarantee a steady flow of electricity to sensitive high-temperature furnaces and production-line machinery needed in special glass-making and lamp production.

Air conditioning was installed only in the special rooms needed for dust-free production of filaments. All pipes and conduits are marked with various colored stripings. This is done for quick maintenance, and to make sure that new plant additions could be easily hooked into all power and fuel lines without digging up foundations or tearing down walls. All fuel and power conduits can be shut off at various places along the piping to facilitate new connections and maintenance.

Summing up, Philips' production engineer says, "You cannot build a plant today just to fit present needs . . . you have to think ahead if you want to keep getting top production at lowest cost at all times." ●

THE MAN: Felix Candela sprinkles Mexico City with curved roof tops.

HIS DESIGN: Church roof consists of intersecting saddle-shaped arches.

Umbrellas Cover New Buildings

Architects in Mexico City are busy changing the city's skyline. But it is at the rooftops where you will see the most startling changes. The roofs are almost entirely the product of a single man, Felix Candela, architect-engineer-builder. He is responsible for a new shape in roofs—the hyperbolic paraboloid (roughly saddle-shaped).

Sr. Candela's firm is called Cubiertas Ala, which means winged roofs, but he usually refers to his products as umbrellas. He has been putting Mexico under umbrellas at the rate of over 2200 square meters a week.

The esthetic appeal attracts clients to the thin, curved concrete roofs, but the designs have also shown superior economy. The church, San Antonio las Huertas, above, is one example of Sr. Candela's architecture. (*Engineering News-Record, May* 16, *p*36)

Northern Railway Company of Costa Rica completes dieselization with purchase of 14 more General Electric diesel-electric locomotives

Fourteen more G-E diesel-electric locomotives will soon help to provide improved rail service between the interior of Costa Rica and its chief port, Limon. These units will join four other General Electric diesel-electrics now in use on this line, as the major part of a replacement program for thirty-four outdated steam engines.

The Northern Railway Company of Costa Rica has operated four General Electric diesel-electric locomotives since 1955. The operating efficiency of these units proved so good that the Railway decided to completely dieselize.

Rated at 500 hp, the new locomotives will be used for passenger and freight service. They'll haul coffee, bananas, cocoa and lumber to the port from the interior and take back such items as construction materials, consumer goods, modern machinery and equipment. In addition, they will also provide transportation service to all intermediate points.

These locomotives will have dynamic braking, which provides electric braking for more efficient operation. The units will also be able to operate in multiple unit for heavy hauling jobs.

Learn how G-E diesel-electric locomotives can help increase the operating efficiency of your railroad. For information, contact your nearest International General Electric Company representative. (135-E11)

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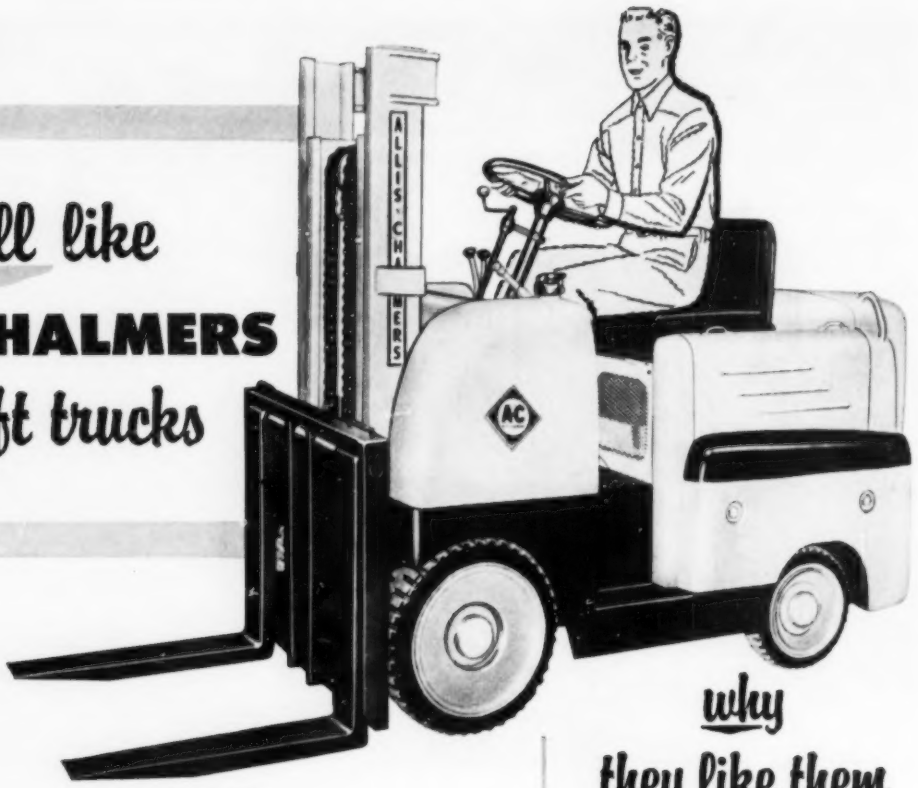

why they like them

MANAGER:

"Would like you to know how well satisfied we are," writes the president of a warehousing company. Operating up and down a steep ramp had caused exceptionally heavy clutch repair costs with older trucks, but, "we have yet to experience clutch trouble with an Allis-Chalmers truck."

Allis-Chalmers fork lift trucks were the first with optional torque converter drive — which eliminates clutch problems, saves shifting, provides torque to operate on steep grades with ease.

MECHANIC:

"Finest truck from a mechanic's point of view," is the comment of a service manager for a lift truck fleet at a bottling plant. "In over 3,000 hours of operation, the Allis-Chalmers truck has caused no trouble at all."

It takes less than a minute to strip an Allis-Chalmers fork truck for servicing — a half hour or less for two men to disassemble right down to the bare frame.

OPERATOR:

"Must have been engineered for the driver," says the operator of an Allis-Chalmers fork truck at a large foundry. "Shifting is handy and I like where the controls are located. Have plenty of room for driving."

Important controls are right where an operator would like to have them. Gauges are in plain sight, easy to read. Floor is clear, operator steps on or off either side.

BHE-12

Join the growing list of satisfied Allis-Chalmers fork truck users. You'll find it profitable in every way. See your dealer or write direct for more information on trucks to fit your needs.

ALLIS-CHALMERS, EXPORT DEPARTMENT MD857,
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BUILDERS OF MACHINERY SINCE 1847

TETRAPOD is lowered into the ocean for placing in the breakwater.

Four Legs Against the Sea

Digested from ENGINEERING NEWS-RECORD, Mar 21, p46

Four-legged concrete blocks, weighing 25 tons each and standing 3.2 meters tall, make up a breakwater at Crescent City, California, U.S.A. This marks the first use in America of the "tetrapod," developed by Etablissements Neyrpic (Grenoble, France) and first used in North Africa in 1950.

Crescent City adopted the tetrapod design after engineers, using available rock, found it nearly impossible to construct a breakwater that would resist the forces of the sea. Tetrapods can dissipate wave energy; they resist displacement.

These are some advantages:

—Facing is permeable, reducing back pressure and wave reflection.

—Facing is rough, and dissipates wave energy.

—Tetrapods interlock for stability.

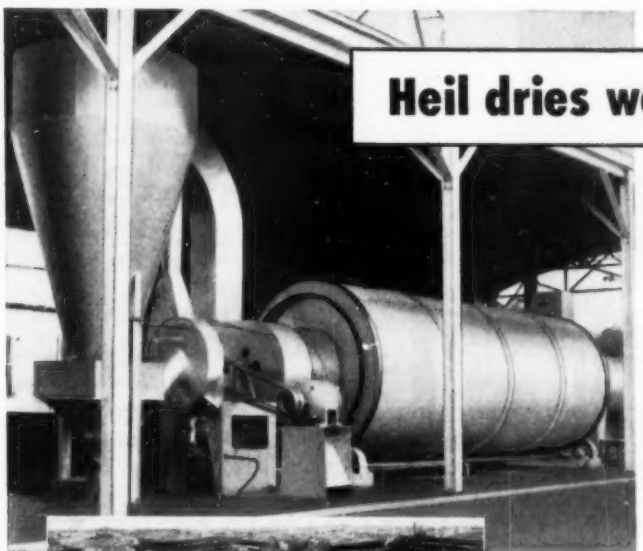
—Facing can have a steep slope, reducing breakwater volume.

—Tetrapods have a low center of gravity.

—They require less concrete, weigh less than blocks.

—They do not require careful placing.

Tetrapods appear to be the only solution where conventional breakwater designs will not work because of wave action. Installations have been made in France, New Zealand, Corsica, Japan, besides North Africa. Spain, Italy, Turkey, Scotland, Mexico and Hawaii are planning or building tetrapod breakwaters. ●



Heil dries wood products uniformly

Wood chips, shavings and wastes, such as sawdust, are dried to uniform moisture content in the Heil dryer. These materials are successfully pressed into quality boards, extruded furniture components and other useful products.

The dryer uses a flow of hot air to carry material through the three-pass drum. A fan on the exit end of the dryer creates the air stream. Small particles move through the dryer quickly. Heavier particles with more moisture content move slower. Both heavy and light materials are dried uniformly.

Write or cable for details on the new Heil dryers with automatic controls.

Heil plants at Milwaukee, Wis., Hillside, N.J., and Lancaster, Pa., have a million square feet of manufacturing space, produce quality products for over 50 different types of business and industry.

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Established 1901

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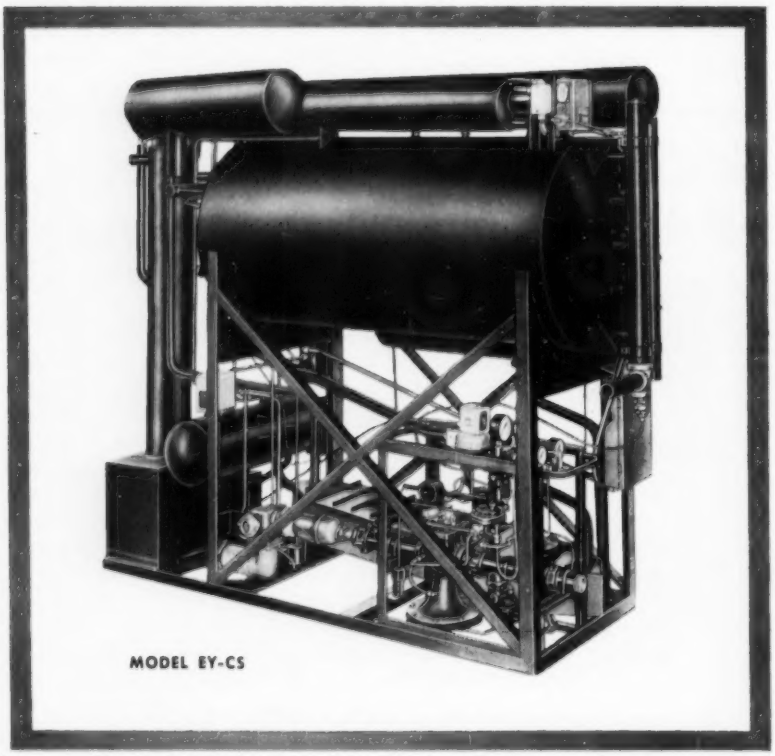
Servel's refrigeration engineering leadership has resulted in a New 25-Ton Absorption Water Chiller that uses low-cost steam as a source of energy. The new unit provides industry with the most effective means for temperature and humidity control wherever necessary . . . or for the dissipation of heat in process work. Here are a few of its many economy advances:



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Servel

Organizing for Management Action

Digested from FACTORY MANAGEMENT & MAINTENANCE, June, p102

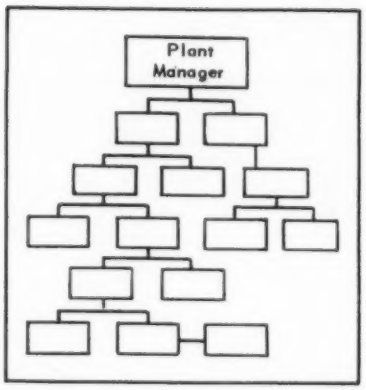
Your plant must develop the type of organization best suited to its operations. All managers are faced with this problem. Kaiser Aluminum Co. (U.S.A.) has developed some guideposts that may be of help.

First, list all functions in your plant.

Next, try to group functions with similar, related objectives.

Finally, arrange the functions in a vertical and horizontal pattern best suited to the situation.

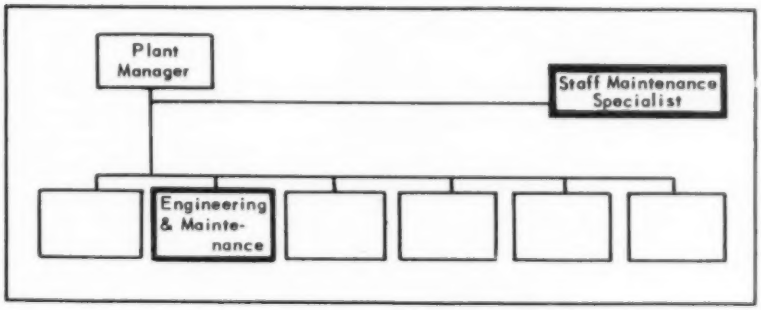
However, there are factors that limit this freedom of combination. A plant manager can supervise only a limited number of different groups. And there are special problems of process and personnel development. Certain structures will work well under a mature, experienced manager, but not under a manager—even a capable one—who is still getting acquainted. Below are some specific problems managers run into.



TOO MANY LEVELS result in poor organization. Information going down the long chain of command can easily become garbled; and information that must come up is slowed down. The manager is too far away from the point of execution to make good decisions. Effective front-line action can be blocked if supervisors have to check with too many levels for approval. And costly production time can be lost if it takes too long to effect changes in orders going down the chain of command.

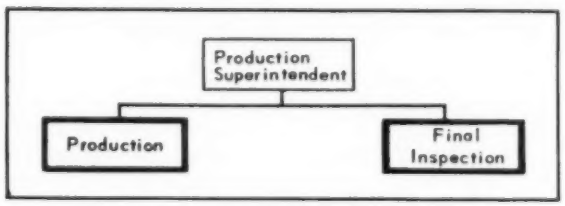
With such an elongated structure, authority and responsibility are cut too fine. There is the added danger of wage and salary differentials becoming too narrow and this creates another administrative headache. Furthermore, it is costly to staff such a set-up.

It is much better to cut down the number of levels as far as possible. The best rule: Never add another level until all alternative solutions to the problem have been explored.

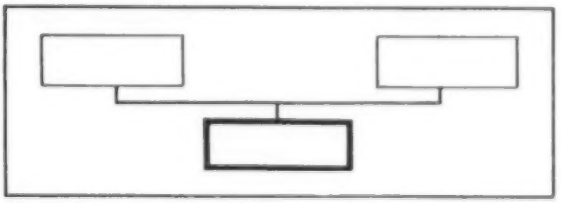


DUPLICATION creates a "gray" area that is loaded with trouble. What is this maintainance specialist supposed to do?

The result is a duplication of effort, or a "After you, Gaston" kind of inaction. Or the plant manager may spend all his time trying to resolve confusion. It might be much better to assign the maintenance specialist to a department superintendent.



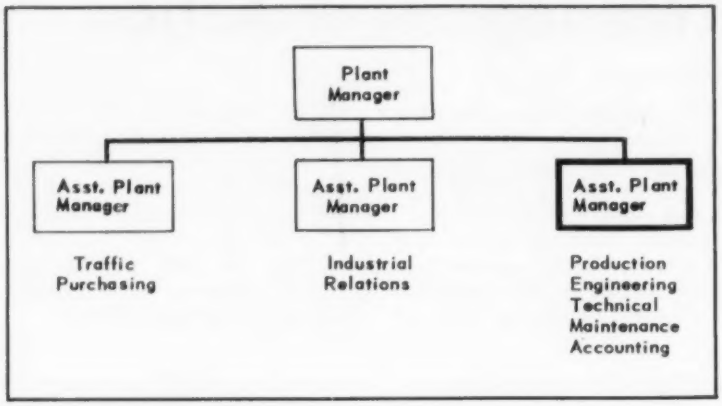
DIFFERENT OBJECTIVES in same group can lead to dilution of one interest, or to harmful collusion. Production and final inspection make such a combination, as do production and maintenance. Responsibility for conflicting objectives should be separated and moved as high as possible in the organization. There must be a system of checks and balances.



MORE THAN ONE BOSS raises delicate problems. Which boss's work comes first? What happens when orders conflict? There is simply no one source of appeal or responsibility for the individual's training, development, promotion. Avoid this hazard at all costs. It might be better to make the assignment on a time basis.

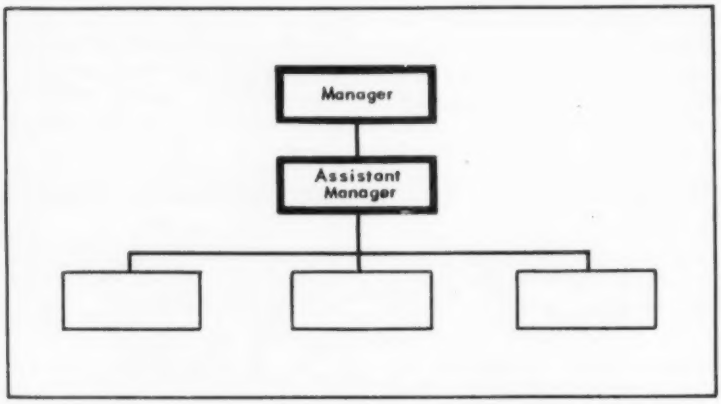
Story continues on next page

"List all functions in your plant . . . Group them according to objectives . . . Then arrange them in a pattern best suited to the situation. Story starts on preceding page.



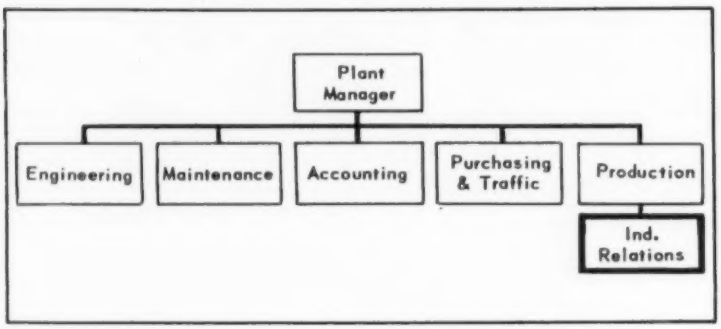
UNBALANCED LOADS is the trouble here, not the idea of three assistants. In this case, the assistant who carries the major plant function—production—also carries the functions that serve production. All are not likely to get adequate attention. At the same time, the duties of the other two assistants tend to overemphasize some services. If workloads are not equal in importance, the important ones are downgraded.

Another drawback is the lack of competition between assistants.



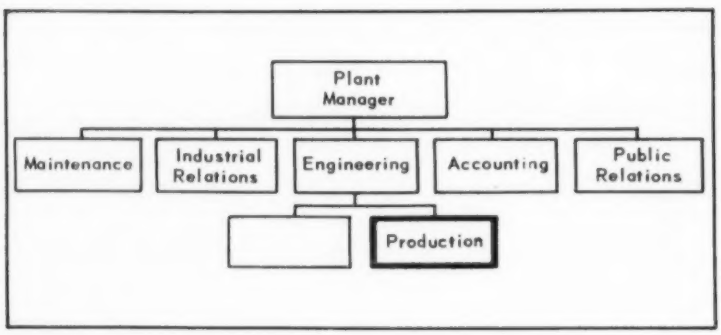
"ONE OVER ONE" structure should be approached with caution. It works well as a training device, or if the superior spends a lot of time outside the plant or office. But the assistant can become merely a messenger; or worse, he can become more of a barrier than an aid—by isolating the manager from his colleagues.

If the assistant has certain functions to perform in the department, they should be plainly spelled out. The chart should show exact functional roles.



MISPLACED SERVICE can create a number of problems. In this case, industrial relations—a function that serves the entire plant—is assigned to a single department. The production manager will find it hard to concentrate on his own problems. And the industrial relations group is likely to become "production-oriented."

It is much better to have a separate and equal status here.

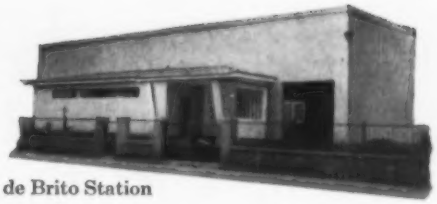


BAD EMPHASIS can place a major function too far from the influence of the plant manager.

This situation looks like a remote possibility, but it does happen—usually as a result of expedience. A production manager in constant trouble might be put under a "trouble-shooter."

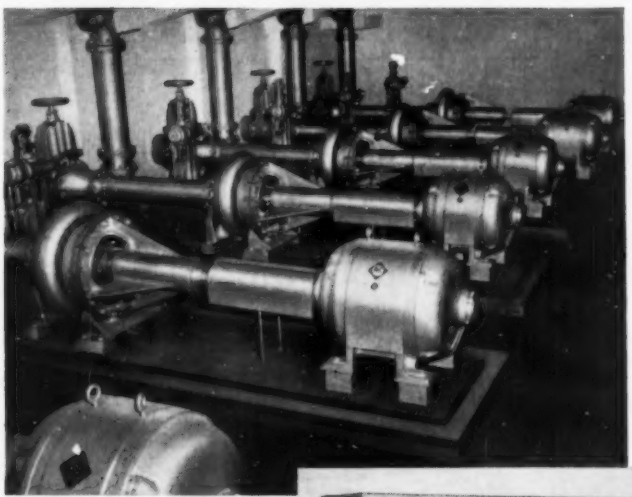
A better solution would be to develop the production manager, and strengthen him with a competent staff—or transfer him.

In Rio de Janeiro...



Saturnino de Brito Station

Every modern sewage pumping station is equipped with Allis-Chalmers Pumps, Motors and Control



These 6 Allis-Chalmers motor-pump combinations are installed at Saturnino de Brito Station which was designed and built by Dr. Enaldo Cravo Peixoto, Director of the Sanitary Sewage Department, and Yamagata Engenharia S. A., General Contractors.

Rio de Janeiro, with over 3 million people in a narrow strip of land between mountains and sea, requires the largest number of sewage pumping stations of any city in the world. All the main stations in Rio are equipped with Allis-Chalmers pumps, motors and control.

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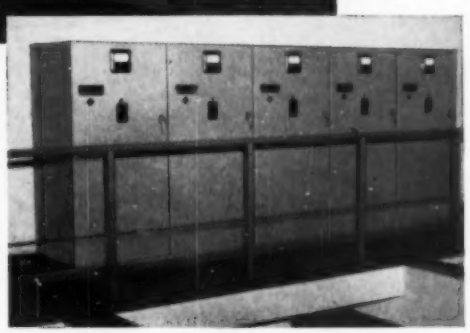
In the same way, Allis-Chalmers offers machinery and engineering aid to all of the world's major industries: electric power, mining, cement making, manufacturing. For help with your equipment problems, big or little, in any industry, contact the distributor in your country, or write Allis-Chalmers, Industries Group, Export Department, Milwaukee 1, Wisconsin, U.S.A.



Allis-Chalmers motor control for the Saturnino de Brito Station. Inaugurated in 1956, this station is one of the newest sewage pumping stations in the extensive chain of pumping stations serving Rio and surrounding areas. All of these modern installations are equipped with Allis-Chalmers pumps, motors and control.

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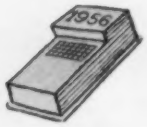
During 1956 . . . 

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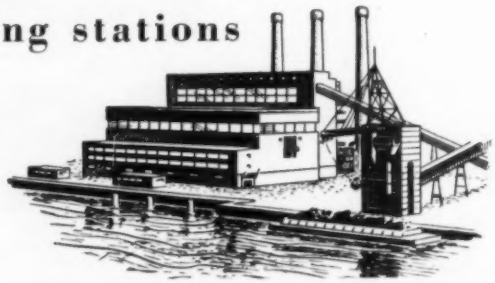

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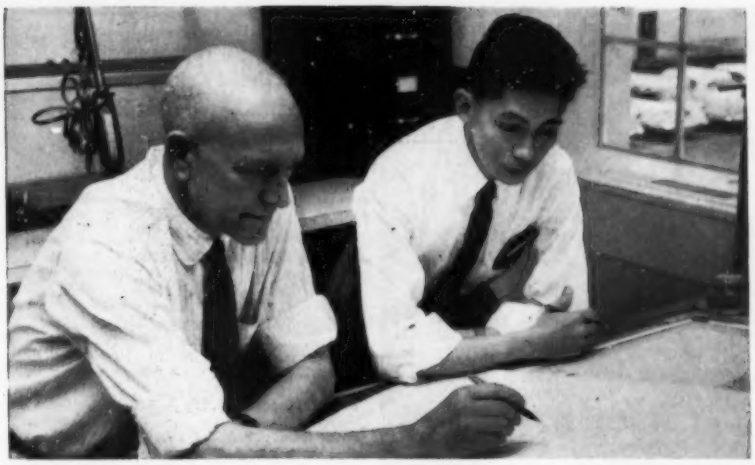

MENELEO CARLOS (right) will become plant superintendent of Resins Inc., Manila, after six months training under a licensing agreement with U. S. firm.

Local Managers "Take Over"

THE two men above are poring over a process layout for a new resins plant in the Philippines, scheduled to go "on stream" early next year. Meneleo Carlos Jr., superintendent of the new plant, has worked closely with Development Engineer Fred Walden (left, above) on the plans—and has even had interviews with some 200 equipment salesmen.

Carlos, Jr., is a chemical engineer, the third generation in his family to have graduated from the U.S.A.'s Colgate University. He looks younger than his 28 years, but officials of Reichhold Chemicals Inc. (White Plains, New York) are more interested in the keen mind behind the features.

Reichhold recently signed a licensing agreement with Resins Inc. for a process to manufacture certain resins. It also agreed to supply technical assistance and management advice.

Holding only a minority interest, Reichhold considers itself "simply a partner" with Resins Inc. Reichhold is one of many American manufacturers that have entered into licensing agreements with foreign firms in the past few years. The U.S.A.'s chemical industry alone earns $50-million a year this way.

These agreements are one reason why individual U.S. companies are tending to export more "know-how" than managers. Another reason is that U.S. concerns operating abroad are employing an ever higher ratio of local employees to foreign personnel, frequently in response to local laws.

The longer a U.S. company operates in any country, the higher proportion of nationals it employs.

It is obviously cheaper to support local managers than Americans abroad—there is a substantial saving in living allowances, for one thing. Also, many Americans—like partisans of any country—do not adapt well to working away from home. Most important, of course, is the local community's desire to train its own managers.

At the same time, however, the total number of American technical and management personnel abroad is increasing—a result of the tremendous increase in U.S. direct investments abroad.

The greatest increase in Americans going abroad is expected to be in the less developed industrial areas—where the ratio of local employees to Americans in a U.S.-controlled company is the lowest. Regional figures are revealing. In the Far and Middle East and Africa, there is an average of one American for every 29 local employees. In Latin America—where 43% of the total Americans abroad work—the ratio is one to 47. And in Europe and Canada the ratio is one to 107.

A recent survey shows that 25,000 Americans now work abroad for private U.S. companies that

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France, Paris . . . . . Loirot & Haentjens . . . Plastics & textile products.
Hawaii, Honolulu . . . Theo H. Davies & Co. Ltd. . . . Plastics, chemicals and textile products.
Holland, Amsterdam . . . N.V. Consolco . . . Chemicals.
Holland, The Hague . . . Handelmaatschappij Vos & Co. N. V. . . . Plastics.
Holland, Rotterdam . . . . . Internatio . . . . . C. A.
Hong Kong . . . Optorg Co. (Malaya) Ltd. . . . Chemicals, plastics & resins.
Hong Kong . . . Getz Bros. & Co. . . . Textile products.
India, Bombay...Banwari Lal & Co., Ltd....Chemicals, plastics, resins, C. A. & textile products.
Indonesia, Djakarta-Kota . . . Messers. N. V. Agung . . . Chemicals, plastics & resins.
Israel, Tel-Aviv. . . Manfred Gottesmann . . . Chemicals & textile products.
Italy, Milano . . . . Euramerica S. R. L. . . . . Resins.
Italy, Milano . . . Usvico (Societa Industriale Commerciale) . . . Chemicals, plastics & textile products.
Japan, Tokyo . . . . Percy Breen. . . . . Plastics.
Japan, Tokyo . . . A. R. Brown, McFarlane & Co., Ltd. . . . Resins.
Korea, Seoul . . . Bando Trading Co., Ltd. . . . Plastics & resins.
Korea, Seoul . . . Celastar Textile Co. . . . . Textile products.
Lebanon, Beirut . . . A. Sahmarani Freres . . . Textile products.
Malaya, Kuala Lumpur...Getz Bros. & Co....Chemicals, plastics & resins.
Malaya, Singapore . . . Getz Bros. & Co. . . . Chemicals, plastics, resins & textile products.
New Zealand, Auckland . . . Hardie Trading Co. (N.Z.) Ltd. . . . Plastics & resins.
Norway, Oslo . . . . Christen Hoeg . . . . . Chemicals.
Philippines, Manila . . . . . Union Trade Distributor . . . Plastics & resins.
Philippines, Manila . . . . . F. E. Zuellig Co., Inc. . . . Chemicals & textile products.
Rhodesia, Bulawayo . . . . . John Beith (Rhodesia) Pty. Ltd. . . . Chemicals.
So. Africa, Durban (Portuguese East Africa, Nyasaland) . . . John Beith (S. A.) Pty. Ltd. . . . Chemicals.
So. Africa, Johannesburg . . . J. J. Allmann Sales Corp. . . . Plastics & resins.
Spain, Barcelona . . . Extractos Curtientes y Productos Quimicos, S. A. . . . Chemicals, plastics & resins.
Sweden, Stockholm . . . A. B. Metall & Bergprodukter . . . Chemicals.
Sweden, Stockholm . . . . Scandinavian Raw Materials . . . Plastics.
Switzerland, Basle . . . . . Chemische Fabrik Schweizerhall A.—G. . . . Chemicals, plastics, resins, & C. A.
Switzerland, Zurich . . . . . Walter Aebli & Co. . . . . Textile products.
Syria, Damascus . . . . . Sahmarani Hammour & Cie . . . . Textile products.
Taiwan (Formosa), Taipei . . . Dah Chung Trading Co. . . . Chemicals, plastics, resins & textile products.
Thailand, Bangkok . . . F. E. Zuellig & Co. . . . Chemicals & textile products.
Vietnam (So.) Saigon & Laos . . . Getz Bros. & Co. (Vietnam) . . . Chemicals, plastics & resins.
West Germany, Hamburg...Karl O. Helm...Chemicals.

AMCEL CO., INC., 180 MADISON AVENUE, NEW YORK 16, N. Y.
AFFILIATE OF CELANESE CORPORATION OF AMERICA

also employ 1.3-million nationals. Oil companies head the list with 11,000; manufacturing, sales, and services employ 6,500; and engineering and construction companies employ 5,000. ●

Digested from Chemical Week, June 15, p61; American Business and Overseas Employment, a report published by the Maxwell Graduate School of Citizenship and Public Affairs.

For the Cardiac— A Full Day's Work

Heart disease strikes a man in his most productive years, when his experience is of greatest use to his company.

What do you do about the employee who has heart disease?

A recent survey of hiring practices of 100 U.S. companies with staff physicians (representing 1.4-million employees) shows that nearly 90% retain employees who incur heart disease. New employment of cardiacs, however, is practiced by only 23%.

Here is the latest thinking on putting cardiacs back to work:

—Careful cooperation is required between the family doctor and an industrial physician, if one is available. A company that takes cardiacs needs a complete classification of jobs—with the mental and physical requirements to match the cardiac to the job.

—"Once a patient recovers," comments one industrial physician, "he can do anything that doesn't produce heart attack symptoms." In fact, records show higher recovery rates from first attacks among production workers than among "desk" workers. But it depends on the individual's motivation.

—If a worker is assigned lighter work, it should be "honest" work, and not a makeshift assignment. And the sooner he returns to work, the better his chances.

—"Sensible" living is essential for cardiacs. Social, family, and recreational stresses are usually more punishing than on-the-job stresses. A low-fat diet is recommended, and air conditioning can be of great help in hot weather. (*Business Week, June* 8, p181)

Cool Air Means Comfort Plus Efficiency

with General Electric Air Conditioners "tailored" to your needs

Here's modern, low cost way to keep customer goodwill and employee efficiency...and do it with amazing economy.

SPECIFY G-E Packaged Air Conditioners for a consistently cool, clean atmosphere. Requiring little, or no, plant remodeling, these units can be installed . . .

ANYWHERE—in areas to be cooled, or tucked away; on the floor or overhead.

ANYTIME—no interruption of daily business; units can be added as needed.

Since units are adjustable to individual area cooling needs, and each unit serviced without shutting down the system, operating costs are minimized. And, G-E offers a 5-year warranty on the sealed refrigeration system.

RIGHT NOW, ask your G-E representative for a "climate" survey of your plant. There's profit in it... **for you.** International General Electric Co., Dept. AC-3M, 150 East 42nd St., New York 17, N. Y., U. S. A. AC-57-3

GENERAL ELECTRIC
—U.S.A.—

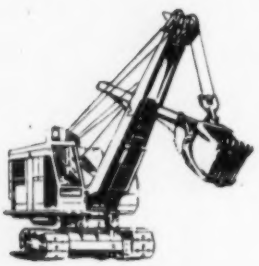
WORLD-TESTED
STURDY
HITACHI'S

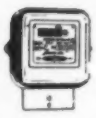
LOCOMOTIVES AND CARS

42" Gauge, 1,900 HP Diesel Electric Locomotive for the Japanese National Railways

Hitachi, Ltd. which has specialized in almost every type of rolling-stock including *Diesel-Electric & Electric Locomotives* for these several decades, maintains also an established reputation as a leading manufacturer of all equipment necessary for railway electrification, such as generators, transformers, mercury arc rectifiers, rotary converters, switch-gears, cables and wires and rail bonds.

Diesel-Electric Locomotives
Steam Locomotives
Electric Locomotives
Battery Locomotives
Passenger Cars
Electric Cars
Freight Cars
Tank Cars
Diesel Cars
Gasoline Cars





Hitachi, Ltd.
Tokyo Japan
CABLES: "HITACHY" TOKYO

Why Small Businesses Fail

Over 12,000 "went under" last year in the U.S.A. alone, and the toll is increasing. There are lessons for management in the reasons why.

Every day, all over the world, small businesses spring up with the eternal hope of success. Many live to see prosperity. But many more succumb to a variety of deadly management diseases.

Ask the businessmen who fail, and you are likely to hear that "bad luck" was a big factor, or perhaps it was "lack of capital"—a disease symptom that is generally accepted without question. But if you talk to the creditors who observed the failures at close hand—and in many cases actually foreclosed the companies—you might find out the real reasons for their failure.

Fortunately, the U.S.A.'s Dun & Bradstreet, a credit rating company, keeps just such records based on the opinions of informed creditors. And presumably the reasons businesses fail in the U.S. are duplicated all over the world.

Dun & Bradstreet says the most common apparent causes for failure are inadequate sales (47.9%), heavy operating expenses (7%), receivables difficulties (8.9%), inventory difficulties (7.9%), excessive fixed assets (6.6%), poor location (3.1%), competitive weakness (21.2%).

Behind these apparent causes, however, are the underlying basic causes. First on Dun & Bradstreet's list is just plain incompetence, and an overwhelming 42.7% of all U.S. business failures in 1956 were so attributed. An unhealthy 18.2% were due to unbalanced management experience. Managerial inexperience accounted for 17.1%. And 13.3% of the failures were caused by lack of experience in the particular field or market concerned.

As a result 12,686 American businessses pondered their profit and loss statements for the last time during 1956—and closed their books and doors. A vast majority of the failures were small businesses, with sales under $1-million. The 1956 rate was over 9% above the year before, and the 1957 rate is running 17% above last year.

Since general management incompetence is such an overwhelming cause, many business observers take a cynical view of the mortality rate. They see it as a necessary shake-down, or weeding out process. But even taking this view, only two out of every five business failures could be considered hopeless cases.

First of all, Dun & Bradstreet notes that disasters—fire, flood, burglary, employees' fraud, and strikes—struck down 1.4% of the failing firms last year. This should be warning enough for management to check its insurance coverage, and personnel policies.

Neglect—bad habits, poor health, marital difficulties—carried under another 4.3% of the failures. Although not listed by Dun & Bradstreet, death can be classified as a violent form of neglect—and the problem is the same. Many a manager has had to take over from a dead or neglectful owner, to find only a "small black book" filled with scribbled names and numbers.

Such cases are often recorded by the "business doctors"—outside management consultants—called in for emergency treatment.

But of all the causes, inexperience and unbalanced experience are the most common, and they are management diseases that react favorably to diagnosis and treatment. Dun & Bradstreet's figures are borne out by the experience of management consultants in the field—and there are a growing number of consultants concerning themselves with the problems of small business.

"Too much emphasis is placed on either production or selling," Robert B. King, of Profit Counselors, Inc., New York consultants, recently observed. "And even where a healthy balance exists, the management of money is neglected."

Consultants can cite dramatic—but perhaps untypical—cases to

AAF Eliminates 53 lbs. of Dust Per Minute In One Plant

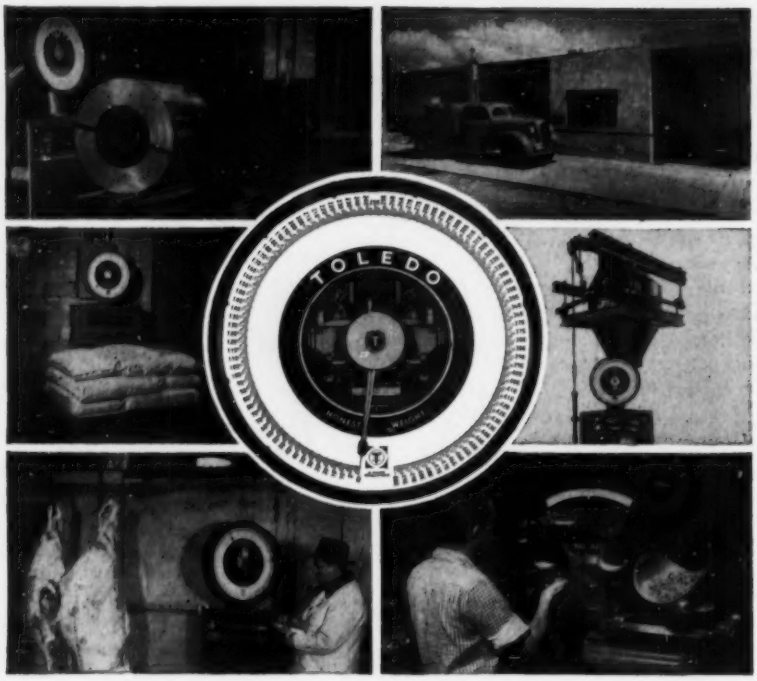
ROTO-CLONES TAKE HEAVY DUST CONCENTRATIONS IN STRIDE. No dust control problem is too big for AAF. One plant was producing 53 lbs. of unwanted dust from two operations every 60 seconds! An AAF ROTO-CLONE on each of these operations turned this trouble-by-the-second into easily-removed sludge.

NO JOB IS TOO SMALL FOR AAF, EITHER! Big jobs, small jobs, fine particles, granular particles, highly abrasive particles—all in a day's work for AAF. That's because the AAF line is the world's most complete . . . includes dynamic precipitators, hydrostatic precipitators, dry centrifugals and fabric arresters.

WHAT'S YOUR DUST PROBLEM? Is dust hampering your production? Is it irritating workers? Is it costing you money? Let an AAF representative show you how it can be controlled, profitably. Write for name of your local AAF representative and free folder, *"Better Air Is Our Business"*.

American Air Filter

COMPANY, INC.
255 Central Avenue, Louisville 8, Kentucky
American Air Filter of Canada, Ltd., Montreal, P. Q.



On Your Scales
Materials Become Money

You can prevent losses and speed your material handling—by bringing your weighing up-to-date with new TOLEDOS that provide automatic indication of weight.

Remember—good weighing is a fundamental of good cost control; basic accounting records of materials received, shipped or transferred start at the scale. In Toledo's complete line there is a modern answer to every problem of industrial weighing . . . to help you save time and money. Write for new condensed catalog No. 2001.

Print Your Weights
Stop Human Errors!

Get fast, accurate *printed* weights with Toledo Printweigh. This eliminates errors in reading, remembering and recording weights. Choice of ticket, sheet or strip tape records. Available on Toledo dial type scales of all capacities.

TOLEDO SCALE COMPANY
Toledo 1, Ohio, U.S.A.

TOLEDO®
Headquarters for Scales

point up what they mean by "money management:"

A dairy products company, doing 60% of its volume in butter, called in a consultant to help expand this end of its business. After analyzing the profit and loss statements over the past 10-year period, the consultant demonstrated to the amazed management that the company had taken a loss on butter every single year. The profit figures from butter, ice cream, and "artificial" ice had been merged, and the management simply didn't realize what had been going on. Profits were actually coming from the company's low volume products—22% net on ice cream, 48% on "artificial" ice —not the high-volume butter production. So, instead of expanding butter production, the company curtailed it.

Not many companies can survive such an oversight. But the point is that small companies often do not organize their accounting to provide management information needed for decision making. Overall figures are there, but there is not a meaningful breakdown of costs, expenses, income, and profits. One answer is a closer working relationship between accountant and manager.

One of the biggest pitfalls of small business, says an American banking official concerned with the problem, is losing sight of the importance of cash. "Keep in mind that it is cash, not inventory or receivables, that pays the bills," cautions Thomas McMahon of the Chase-Manhattan Bank. "If additional sales volume can be gained only by carrying slow receivables, the prize is usually not worth the game. . . . Avoid an excessive investment in inventories. The moment a company's inventories exceed the amount of net working capital, cash and receivables are insufficient to cover current liabilities."

Also, the small businessman should avoid excessive investment in fixed assets. High fixed costs tend to increase the breakeven point, and they may well become burdensome in slack periods.

When small businesses need cash, the banker naturally advises a trip to a bank. But he suggests that a relationship be established

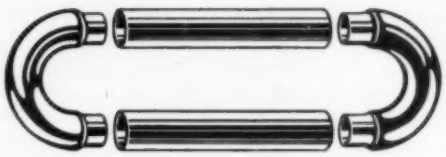
MUELLER BRASS CO. QUALITY PRODUCTS

for refrigeration and air conditioning heating and plumbing

One dependable source for all your requirements . . . from fittings to forgings

180° RETURN BENDS

A complete range of sizes for condensers, cooling coils, etc., with plain or cupped ends. Both O. D. wall thicknesses and center-to-center dimensions carefully matched to customer's specifications.

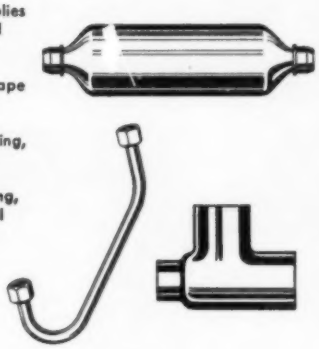


STANDARD AND REFRIGERATION TUBING

For all piping, refrigeration, and air conditioning requirements, Mueller Brass Co. Streamline copper tubing is available in all required wall thicknesses, and hard or soft tempers.

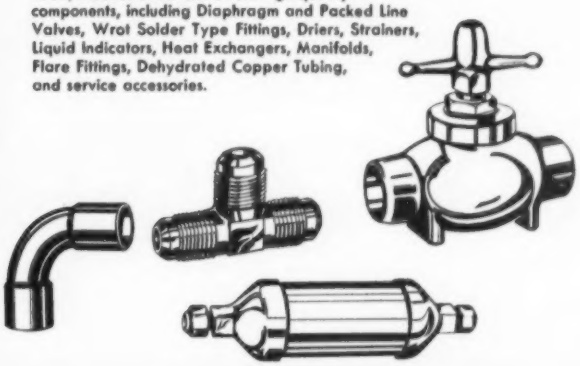
FORMED COPPER TUBE AND ASSEMBLIES

Mueller Brass Co. supplies formed copper tube and assemblies with special bending temper. Cut to customer's size and shape specifications. Complete facilities for swaging, bending, spinning, upsetting, flaring, flattening or sealing, beading and grooving, drilling, piercing, machining, joining . . . all at consistently close tolerances.



REFRIGERATION PRODUCTS

For virtually every refrigeration and air-conditioning need, Mueller Brass Co. offers high quality components, including Diaphragm and Packed Line Valves, Wrot Solder Type Fittings, Driers, Strainers, Liquid Indicators, Heat Exchangers, Manifolds, Flare Fittings, Dehydrated Copper Tubing, and service accessories.



APPLICATIONS

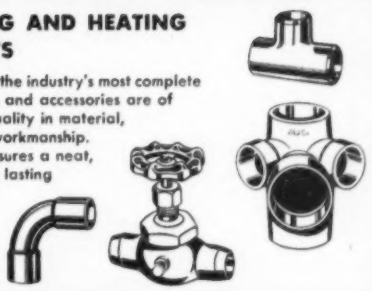
For sugar and paper mills, breweries, distillers, and other industrial applications, Mueller Brass Co. copper tubing is supplied to customers' specifications.

PACKING

Mueller Brass Co. can pack mixed groups of items for delivery to different job sites for any customer—an added saving to you by reducing rehandling costs.

PLUMBING AND HEATING PRODUCTS

"Streamline", the industry's most complete line of fittings and accessories are of the highest quality in material, design, and workmanship. Streamline assures a neat, efficient, long lasting installation.



PLASTIC PIPE AND FITTINGS

Rugged Streamline polyethylene plastic pipe and all types of fittings, both copper and plastic, are excellent for a variety of jobs where the flexibility of plastic is needed.

203

40 OUR 40TH YEAR MUELLER BRASS CO. 1917-1957

MUELLER BRASS CO. Port Huron 43, Michigan, U.S.A.

Cable address: Streamline

DOES WORK USUALLY HANDLED BY CLAMSHELL

...plus many other jobs

TRACTOMOTIVE TL-11 TRACTO-LOADER keeps the bin of a ready-mix plant well-supplied with sand and gravel . . . and fills in "waiting-periods" by doing other jobs — transports concrete pipe, reinforcing wire and rods, concrete block . . . loads cinders . . . does general yard-cleanup work.

HOW IT'S DONE. Above is an over-all view of a bucket elevator with a two-compartment overhead bin — one for sand, one for gravel. Below, the TL-11 TRACTO-LOADER, with its 0.86m³ (1⅛-cu yd) bucket, feeds a ground level hopper at base of elevator. The elevator carries material from hopper to bin.

Operator said he likes the stability of the TL-11 — carries heaping loads without rocking. In the TL-11, you get the long wheel base and strong construction of our 4-wheel-drive TL-12 Tracto-Loader . . . plus the short turning radius of our 2-wheel drive TL-10.

Ask your ALLIS-CHALMERS CONSTRUCTION MACHINERY DEALER to show you the TL-11 or the other four Tracto-Loaders in action. Send for free catalog.

TRACTOMOTIVE

TRACTOMOTIVE CORPORATION

Export Dept., MD, Deerfield, Ill., U.S.A.

long before a loan is needed.

Another tip: Give more attention to equity financing—when business is going well. "More loan applications are rejected because of insufficient ownership capital than for any other reason."

If equity shares are carefully dispersed, control can be retained with a fraction of total ownership. Or non-voting common stock can be issued.

Small business, of course, suffers from smallness. More often than not, there is a "key man" who started the business or was hired to do the job. He knows one area of the business well, perhaps even two areas fairly well, and he tends to concentrate on his specialty. The result of smallness is unbalanced operations.

The "key man" also tends to undermine the authority of second-line managers—he fires a worker without their consent, or arbitrarily reverses decisions.

Another consequence of management imbalance or inexperience is a lack of control systems. Purchasing is a perpetual emergency. Production costs and checks are not adequately reported, often not even asked for.

Banker McMahon urges that small businesses emphasize flexibility. "The ability to change direction, pursue new product lines, diversify, retrench, in fact, to follow whatever policy the occasion dictates, is the keystone to success." ●

In Management

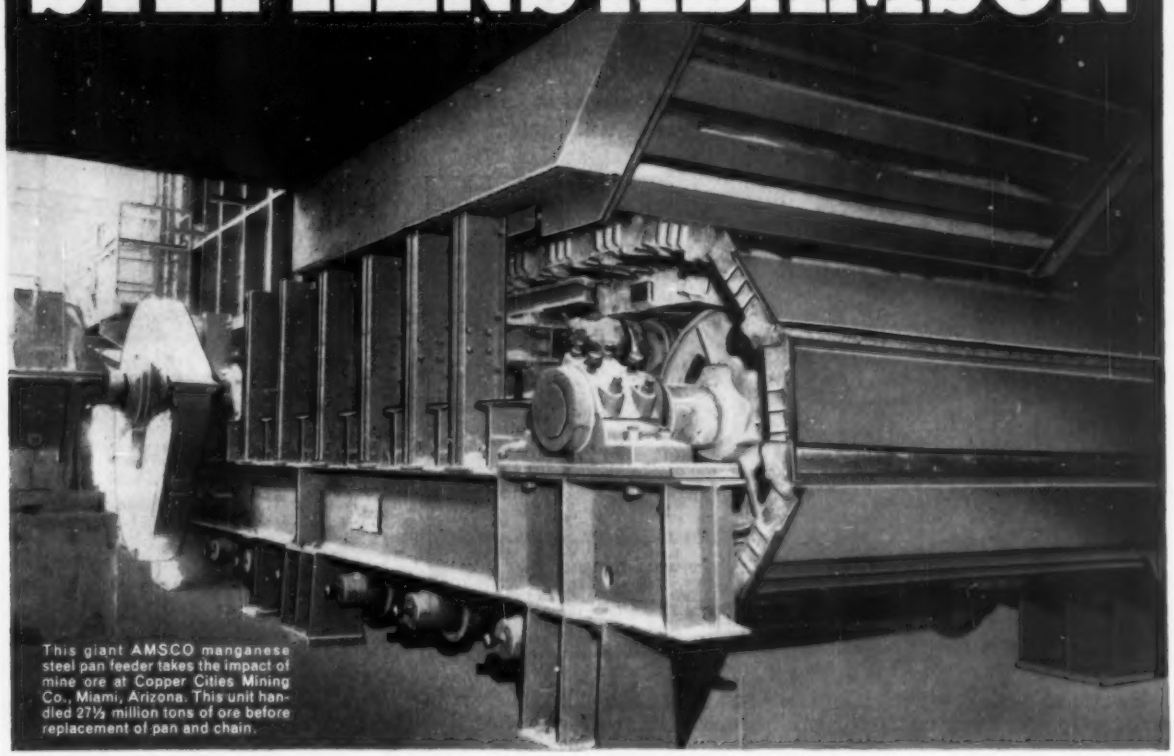
● "MORE FLOOR PANS," the foreman above signals. Sign language—long used successfully in the construction business—can also come in handy in an indoor plant with high noise levels, or where distances are great. Distance is the problem at the huge assembly plant of the Ford Motor Co. at Mahwah, New Jersey (U.S.A.). Ford assemblers worked out a complete system of signals for automobile and parts. (*Factory, June, p94*)

● CYCLE BILLING is a hotly-debated subject among American credit men these days, and the idea may have applications elsewhere. Instead of sending out bills to customers once a month, the credit department works through the accounts in a cycle, then starts over again. Advocates say the method reduces the clerical load.

One store uses a ledger card that can be "aged" at a glance. As soon as the billing cycle is finished, the clerk works through the ledgers and flags the delinquent accounts. This way, serious delinquents get the attention they deserve. (*American Business, June, p30*)

● EAR-PHONED ARCHIVIST, working in a modern records storage center, transmits information asked for by a busy executive in minutes. The record leaves its storage box only long enough for the archivist to read the information over his telephone. When the record outlives its usefulness, it is destroyed. This kind of arrangement is highly recommended by the U.S.A.'s National Records Management Council, a nonprofit organization. (*Chemical Week, May 18, p60*)

STEPHENS-ADAMSON



This giant AMSCO manganese steel pan feeder takes the impact of mine ore at Copper Cities Mining Co., Miami, Arizona. This unit handled 27½ million tons of ore before replacement of pan and chain.

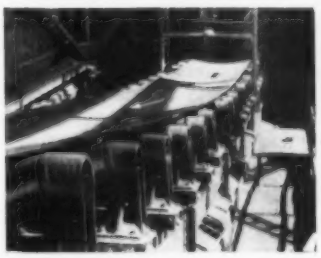
heavy duty ahead for your ore *Conveyor System*

How will you move a lot of ore under or over the ground, through processing, in and out of storage, to and from shipping—move it fast, at the least cost?

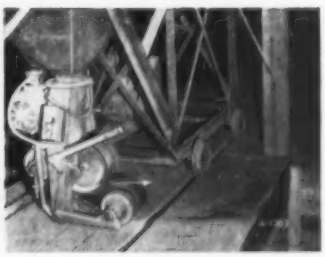
Mechanization is the way, the S-A way, and it's done by close prior study of your requirements by the best engineering brains in the bulk material conveying industry. These men are backed by a quality line of material handling and conveying equipment designed to move any type of ore in any quantity.

Long range planning of your ore handling needs is important. This calls for a conveyor system engineered for the years to come. You can find these kind of STEPHENS-ADAMSON systems everywhere in the world, moving all kinds of ore products at rock bottom cost.

Wherever you are, S-A engineers can design, build and install your conveyor system. They are available to work with your engineers or with your consultants.



A South American copper mine has been using an S-A system for 25 years. The original installation totals 18,485 feet and in terms of ore delivered is in the multi-million ton class. Six Amsco feeders are included in the system. S-A carriers, probably the largest ever built, weigh almost 1000 lbs. each.



Handling a wide variety of zinc ores, a complete S-A system conveys to storage by means of feeders, bucket elevator, shuttle conveyor, and centrifugal pilers. SACO speed reducers are used on all conveyor drives and spring type belt wipers keep belt surfaces clean. Close-up here shows centrifugal thrower.

S-A manufactures a wide range of material handling products in three complete plants in U. S. and Canada.

- Belt Conveyors
- Belt, Pan & Plate Feeders
- Ship Loading Boom Conveyors
- Stacking Conveyors
- Storage & Reclaiming Systems
- "Natural Frequency" Vibrating Conveyors
- REDLER Conveyor-Elevators
- ZIPPER Conveyor-Elevators
- Conveyor Belt Cleaners
- Headshaft Holdbacks
- Grizzlies & Screens
- Centrifugal Pilers
- Bin Gates & Tunnel Gates
- Car Pullers & Spotters
- Bucket Elevators
- Skip Hoists
- SEALMASTER Ball Bearing Units

• *Write for a bulletin on any of the above products.*

STEPHENS-ADAMSON MFG. CO.

123 RIDGEWAY AVENUE, AURORA, ILLINOIS
LOS ANGELES, CALIFORNIA
BELLEVILLE, ONTARIO

EXPORT DEPARTMENT
123 RIDGEWAY AVENUE, AURORA, ILL., U.S.A.

SALES ENGINEERS ARE LOCATED IN ALL MAJOR CITIES OF THE FREE WORLD!

No Guesswork When Laboratory Crushing or Grinding is Done by Sturtevant Machines

"Open-Door" Design Provides Quick Access for Cleanout — Guarantees Accurate Samples

Sturtevant Automatic Coal Sampler at Con Edison's Laboratory (New York). Sturtevant Bulletin No. 85 describes this machine.

In a matter of seconds, because of hinged access doors, all crushing or grinding parts are exposed for thorough cleanouts — 100% accuracy in sampling.

Design of Sturtevant laboratory machines is based on production models. Higher output — to scale with actual production quality and output, is built into each machine. Add rugged construction and you have a machine that keeps on top of lab or pilot work.

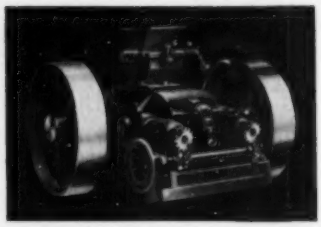
Preferred by laboratories that demand accuracy and dependability in test or pilot runs, Sturtevant laboratory machines have long been used by the 'blue chips' of industry and education. Names on request.

Send for Bulletin 067, which gives full description of all Sturtevant laboratory machines. (Bulletins are also available on Production Crushers, Grinders, Blenders, Air Separators, Micronizers and Automatic Coal Sampler.) Write Sturtevant Mill Company, 141 Clayton St., Boston 22, Mass.

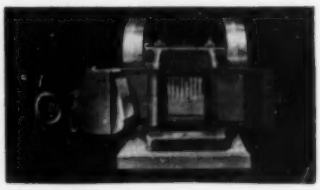
SWING-SLEDGE MILL RETIRES AFTER 25 YEARS...

Ruggedness of Sturtevant machinery is well-known in industry, where even laboratory-size Sturtevant units are sometimes used for round-the-clock production.

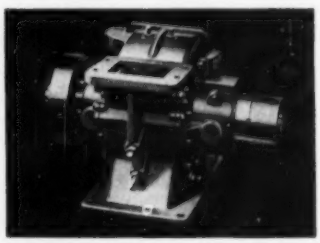
Jas. F. Morse Co., Boston, recently replaced their small-size Swing-Sledge Mill, which had been doing production grinding for 25 years. It was used to grind ⅝ in. tankage into bone meal. Repairs in 25 years? "Just grates and hammers," reports Plant Manager W. Carleton Merrill.



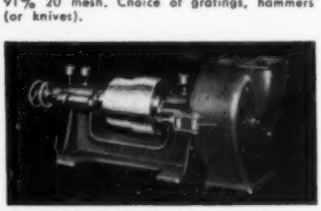
Lab Crushing Rolls: Specially designed for laboratory sampling, Crushing Rolls come in two sizes: 8 x 5 in. and 12 x 12 in. Capacities run as high as 10 tons per hour. Automatic adjustments: 8 x 5 in. model adjusts from ½ in. to 20 mesh; 12 x 12 in. model from ⅜ in. to 20 mesh. Tires are high carbon forgings and extra tough. Feeder is automatic, adjustable.



Lab Jaw Crusher: Full or part-time duty for crushing hardest rocks: 2 x 6 in. opening Jaw Crushers have roll jaw action — no clogging. Hard rock capacities: ½ in. setting — 1900 pounds per hour; ¼ in. setting — 1200 pounds per hour; ⅛ in. setting — 800 pounds per hour. Instant in-operation adjustment. Jaw Crushers have manganese steel jaw plates, reversible shields, steel pitman, anti-friction bearings.



Lab Swing-Sledge Mill: 5 x 6 in. feed opening takes soft, medium, tough or fibrous material. Capacity to 1 ton per hour, fines regulated from 1 in. to 20 mesh. Single-pass limestone grinding produces 99.8% 10 mesh fines, 95.8% 20 mesh. Single-pass bituminous coal pulverizing gives 99.9% 10 mesh fines, 91% 20 mesh. Choice of gratings, hammers (or knives).



Sample Grinder: Disc type grinders for dry, friable, soft or medium materials. Three sizes — 6 in., 10 in. and 14 in. take feed as coarse as ¼ in. 100 mesh fines at rates to 200 pounds per hour on largest model. Product regulates from 10 to 100 mesh. In-operation adjustment.

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YOU AND YOUR PERSONAL AFFAIRS

There are many reasons for collecting stamps, and speculating for a profit is not the least of them. But most amateur collectors have intellectual interests that fit in well with stamps—geography, travel, history, graphic arts. And the hobby fits businessmen well: It provides relaxation, and business offices have good access to stamps.

If you are a beginner, you will probably want to start with an illustrated album. Just paste the stamps over their pictures. The best albums have loose leaf pages, descriptions.

"Topical" collections can be inexpensive and interesting. You can save pictures of fish or fowl, fruits, airplanes, nudes, Rotary, personalities—anything that catches your fancy.

As you get involved, you will probably graduate to a catalog. The most widely used general catalogs are Zumstein's from Germany, Yvert's from France, Gibbons' from Britain, Scott's from the U.S.A. These publishers also put out specialized catalogs—by country and by region.

One word of warning on catalogs. Listed values are usually much higher than retail prices—about 50% above in Scott's listings, for instance.

The value of stamps is based on demand. Over the years your collection will increase in value. Specialized collections —with complete sets—bring the best prices. When sets are sold at auctions, the rarer stamps act as "come-ons." One of the greatest joys of advanced collectors is the "quest" for rare stamps missing in a set.

But value still depends on demand, not rarity as such. Popular specialties sell better than unpopular specialties. And collections are usually more valuable close to home—a British collection in Britain, a Japanese in Japan, etc.

If you are interested in speculation, there are plenty of success stories (you never hear the other kind) to whet your appetite. Early United Nations and Israeli sets, for example, have skyrocketed in value. U.S. commemoratives have returned some fat profits to speculators. And remember, speculative investments that don't seem to pay off can always be recovered by using the stamps as postage, if you stick close to home. But the fact is that most collectors are not in a position to predict speculative interest or popular demand.

You will discover that condition is very important. Imperfections are complicated, and postmarks have their significance too. Such details can make stamp collecting fascinating and profitable, but it is the intellectual interest and the relaxation that bring the greatest reward.

●

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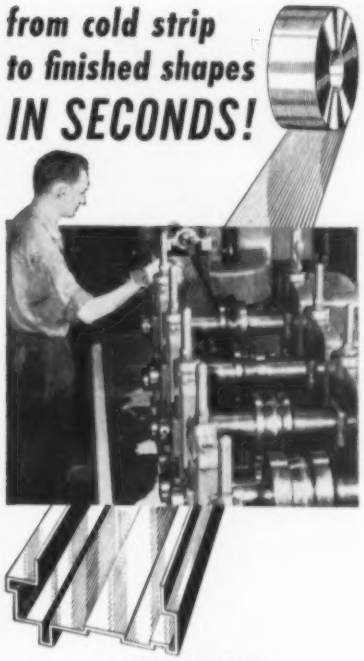

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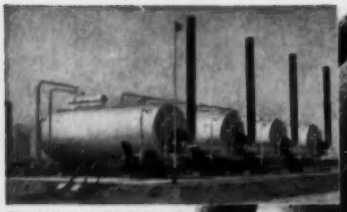
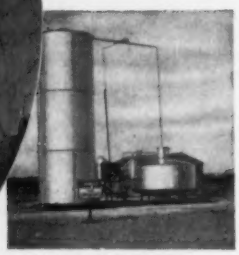


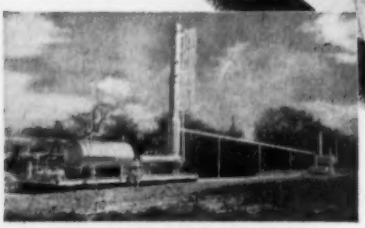
EMULSION TREATING

WATERFLOOD EQUIPMENT

NATURAL GAS DEHYDRATION



LEASE AUTOMATION



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● YOUR MANAGEMENT READING

Management Digest's editorial staff here again does the "worthwhile reading" for you to save your time. For the following literature, please write on your company letterhead directly to the address given, mentioning Management Digest.

Working With Figures—"Company Investigations of Automatic Data Processing" tells you how various companies decided what, if any, automatic equipment they should acquire. Price: $3.00. (Harvard Business School, Div. of Research, Soldiers Field, Boston 63, Massachusetts) . . . If you can't afford costly electronic computers, the desk calculator still forms the computing backbone of most engineering offices. "Computing With Desk Calculators" tells how to do it. Price: $2.00. (Rinehart & Co., 232 Madison Avenue, New York 16, New York.)

"The Western European Markets"—Here is a descriptive and statistical survey of 21 markets, containing 335-million potential customers. This latest volume in J. Walter Thompson Co.'s World Markets Series discusses basic trends in Western Europe's economy, analyzes 21 markets (including West Berlin and the Saar) and provides information on market research. Price: $18.00. (McGraw-Hill Book Co., 330 W 42nd St., New York 36, New York.)

"Production Forecasting, Planning & Control"—There's a wealth of material on operations research and production stabilization in this book. The author tells how to break complex problems down into a number of small, simpler ones. Price: $8.25. (John Wiley & Sons Inc., 440 4th Ave., New York, New York.)

"Satisfying Salaried Employees"—This practical manual is designed to help employers find out what satisfactions salaried workers want in their job, and then points up ways of providing them. Price: 50¢. (National Association of Manufacturers, 2 East 48th St., New York 17, New York.)

Guide to South America—The 1956-57 edition of the South American Handbook is a handy guide to every country of the continent. Information on cities, towns, hotels, communications, travel facilities, trade and market data is included. Price: 17/6, or $2.50. (Trade & Travel Publications Ltd., 14 Leadenhall St., London EC 3, England.)

Bulletins from Industry—All about materials-handling: Webb Catalog 157 covers in detail the design features and applications of Towveyor and Tow-Conveyor systems. (Jervis B. Webb Co., 8951 Alpine Ave., Detroit 4, Michigan) . . . The new G-3 Series of 15,000 to 20,000 lb. capacity industrial lift trucks are presented in a 16 page brochure. (Yale & Towne Mfg. Co., 11,000 Roosevelt Blvd., Philadelphia 15, Pennsylvania) . . . Condensed Catalog TC-94 describes Clark's complete line of fork-lift trucks, straddle carriers, powered hand trucks and towing tractors.(Clark Equipment Co., Battle Creek, Michigan) . . . Data on the Big Joe line of manually-propelled, battery-operated hydraulic lift trucks is presented in Catalog 257. (Big Joe Mfg. Co., 97 Oak St., Wisconsin Dells 1, Wisconsin) . . . Bulletin 125-X covers machinery, components, and complete systems for conveying, screening, sizing, elevating, distributing, and storing loose bulk materials. (Hewitt-Robins Inc., 666 Glenbrook Rd., Stamford, Connecticut) . . . Design features of Allis-Chalmers "FT" and "FB" fork trucks, towing tractors and "Chore Boy" platform trucks are described and illustrated in Catalog BU-305. (Allis-Chalmers Mfg. Co., Buda, Div., Milwaukee, 1, Wisconsin.)

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● In the search for ways to cut costs and increase production, management turns to materials handling.

● Up to 40% of a product's cost may be charged to moving, lifting, carrying materials. The problem: devise a way to simplify those operations.

● Analyze your materials flow, choose the best handling system, and plan how to control it. Here are some ideas.

Planning Materials Handling

Everywhere, a growing demand for goods . . . factories straining production facilities . . . increasing competition among suppliers . . . higher costs—of labor, raw materials, working capital.

Sooner or later, in every plant, one area of production planning will stand out as the most likely for cost reduction. Sooner or later, every management runs into this inescapable fact:

The handling of materials is one of the most important factors in production cost—yet it contributes not a peso or a pfennig to product value.

Progress in adopting the techniques of materials handling has been slow, even though the advance of mass production techniques is intimately connected with materials handling. For years, managers tended to push the materials-handling function into the background. Then, in the past few years, the worldwide production drive has pushed materials handling onto the center of the stage.

The cost of handling any product can be compared to an iceberg. The part that stands out of the water—charges for labor and equipment—is just a small fraction of total cost. The hidden part is much greater and includes lost production time when needed materials are delayed in reaching the machines; the damage to equipment, products, and materials caused by poor handling; and the risks to future sales because customers have to wait too long for their orders.

Even in the best managed plants, materials handling consumes some 25% of the product cost; indeed, in some operations the materials-handling component can be as high as 40%. This is incentive enough for management to look first at handling for cost cutting.

But management needs the complete facts. Only then can it be certain that a plant's handling system is as good as it should be.

THE COVER shows an unorthodox way of loading a lift truck. But St. Regis Paper Co. (New York), who loaned the picture to MANAGEMENT DIGEST, planned it that way—with packages piled high on a fast-turning truck. The idea is to show off the advantages of St. Regis' new anti-skid coating for paper bags.

It's easy enough to tell when you have a materials handling problem:

—**Workers spend a lot of time lifting** materials by hand.

—**Plant aisles are cluttered** with materials. This usually means that there is not enough production and storage space.

—**Work goes back along the production line** frequently for the next step in manufacturing.

—**The accident rate is on the increase.** Manual handling will expose workers to many more situations that are likely to cause accidents.

These are the problems. As you work toward solutions, keep these goals in mind:

—**to eliminate all unnecessary movement** and handling, reducing to a minimum all other elements of materials handling.

—**to keep materials in motion.** Where possible, they should be processed while they are moving.

—**to keep materials off the floor.**

I. Beginning an Analysis

The first thing you will have to study is the nature of the materials you are moving. Are they heavy or light, small or large, metal or non-metal, bulk or solid? Then you have a good start toward simplifying handling. For example, it may be possible to group similar items, and combine movements of items going in the same direction.

Still another piece of basic information is the amounts of materials involved. This should cover everything—materials, assemblies, components—that is necessary to make and package the product. And it should include both the items a plant produces and those it buys on the outside.

Next comes the question of volume of finished products. Not only should you study present production rates, but—most important—you should have some idea about future output.

Now find out where all this material is going. Charts can give you a visual picture of where materials go, what work is done on them at production stations, tools and fixtures involved, and so on. The sample charts on the next page show one

way to assemble information on the movement of materials.

Templates and scale models expand the visual analysis of what the charts record. Cardboard cutouts of the shapes of the equipment can be placed on a plant-layout drawing to give an idea of the use of space. Better still, scale models provide a three-dimensional picture of materials flow.

One more chart is necessary before managers can go ahead and make an analysis. It is called a "capacity chart," and shows the relationship of one operation to another. It focuses attention on those operations or events that are likely to prevent or obstruct production flow at the rate you want. It does this by providing a breakdown of each operation into producing time (when useful work is being done) and handling time. Information for the chart can come from a work-study analysis.

Any amount of detail can be built into a chart of this type. The chart also provides the means for calculating the amount of work in progress, materials in storage, supplies needed between operations and between shifts. And it can also help determine the space necessary for these purposes as well as for production operations.

II. Interpreting the Analysis

Now that you have a mass of information—much of it charted—it has to be interpreted to find the best way to move your materials. The charts help point out weak spots. For instance, they tell you where too much time is spent in handling, the kind of handling involved and the equipment used. It is now up to management to make corrections—perhaps with advice from industrial consultants, materials-handling associations, or equipment manufacturers.

Corrective measures may involve making some simple procedural changes, getting new equipment, or even making drastic changes in the plant layout.

A plant's physical limitations will determine to a great extent the amount of layout changes you can make and the kind of equipment you will need.

These are some of the physical features you will have to evaluate:

—Location of walls and columns; width of aisles and doorways.

—The weight that floors will safely carry; and the plant's access to transportation.

—Layout of machines and storage areas.

All have a decided effect on any materials-handling system. For instance, fork trucks would not be a wise choice for a multi-story plant with a small floor area on each level—especially if material has to move up and down between floors. Nor would conveyors be practical if you move materials infrequently over a long distance.

Old buildings, of course, present special problems. The trend today is toward single-level plant design—on the theory that flow between production stations can be better or more cheaply organized. But older, multi-story buildings do have advan-

(Handling continues on next page)

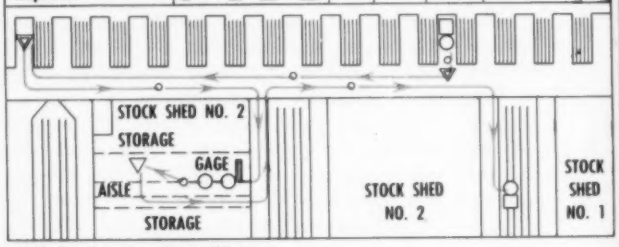
FLOW PROCESS CHART below shows present materials flow

SUBJECT CHARTED
CHARTED BY
CHART NO. 1 – SHEET 1 OF 1
DATE
PLANT
DEPT.

GENERAL DATA
Skid pallet 1.4 x 0.9 meters
366 tile per skid pallet
985 kg. per skid pallet
1800 kg. capacity fork truck
Corr. paper expendable pallet

PRESENT METHOD

DESCRIPTION OF OPERATION	HDLG.	MOVE	INSP.	TEMP. STOR.	PERM. STOR.	MEN REQ'D	DIST. MOVED	TIME IN MIN.	EQUIP'T USED TO MOVE MATERIALS
Inspection	○	○	□	▲	△				
Place tile on pallet on dolly	○	○	□	▲	△	1		9.40	Manual handling
Pull to aisle	○	○	□	▲	△	1	7.8	0.75	4 wheel dolly
Temporary storage	○	○	□	▲	△				
Move to temp. storage	○	○	□	▲	△	1	79.5	1.00	Fork truck
Temporary storage	○	○	□	▲	△				
Move to gaging mach.	○	○	□	▲	△	1	63.0	0.70	Fork truck
Gage tile	○	○	□	▲	△	1		17.10	
Place on pallet	○	○	□	▲	△	1		17.10	Manual handling
Move to perm. storage	○	○	□	▲	△	1	19.5	0.45	Fork truck
Permanent storage	○	○	□	▲	△				
Move to freight cars	○	○	□	▲	△	1	150.2	2.25	Fork truck
Unload in freight cars	○	○	□	▲	△	1		9.00	Manual handling
Inspection	○	○	□	▲	△				



What the Symbols Mean

○ OPERATION — Contributes towards the completion of the product. Contains handling, manipulative, and other unproductive elements.

□ INSPECTION — Confirms attainment of quality standards and verifies quantities. Quantity checks are not universally accepted as a function of inspection.

Charting Solutions

The best way to see what is happening to your materials handling is to make a few charts. Charts can provide a large amount of factual data and make analysis much easier.

Process flow charts (above left) graphically show the relationships between all operations in a process—transportation, inspections, delays, storage. In addition, the charts show operation and storage time, distance traveled, and other pertinent details. Basic symbols are used to simplify charting of what happens in each step of the process.

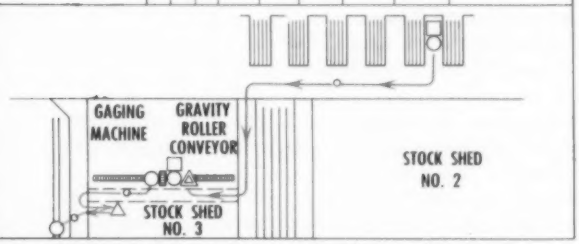
After you chart your present system, make an

PROPOSED METHOD changes flow, is better handling system.

		PRES.	PROP.	SAVE
METHOD	No. of operations	4	4	0
	No. of transportations	5	3	2
SUMMARY	No. of storages	3	2	1
	No. of inspections	2	2	0
	Man hours	58.75	46.10	12.65
	Distance traveled (meters)	320	84	236

PROPOSED METHOD

DESCRIPTION OF OPERATION	HDLG.	MOVE	INSP.	TEMP. STOR.	PERM. STOR.	MEN REQ'D	DIST. MOVED	TIME IN MIN.	EQUIP'T USED TO MOVE MATERIALS
Inspect and place tile on pallet	○	○	□	△	△	1		9.40	Manual handling
Move to temp. storage at gaging machine	○	○	□	△	△	1	42.0	1.00	Fork truck
Temporary storage	○	○	□	△	△				
Gage tile	○	○	□	△	△	1		17.10	Manual handling
Inspect and place on expendable pallet	○	○	□	△	△	1		17.10	Manual handling
Move to perm. storage	○	○	□	△	△	1	30.0	0.50	Fork truck
Permanent storage	○	○	□	△	△				
Move to and load freight cars	○	○	□	△	△	1	12.0	1.00	Fork truck

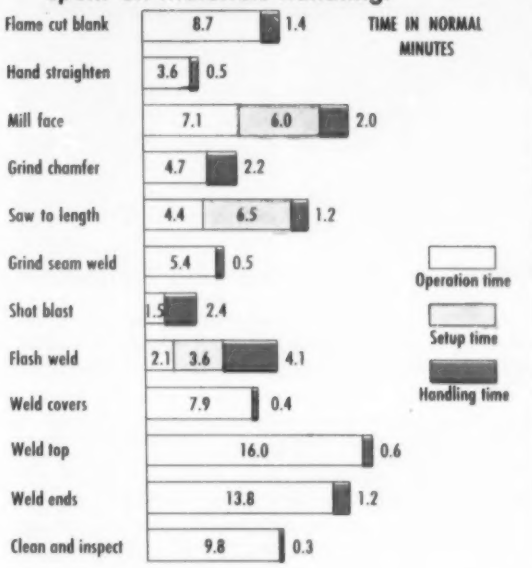


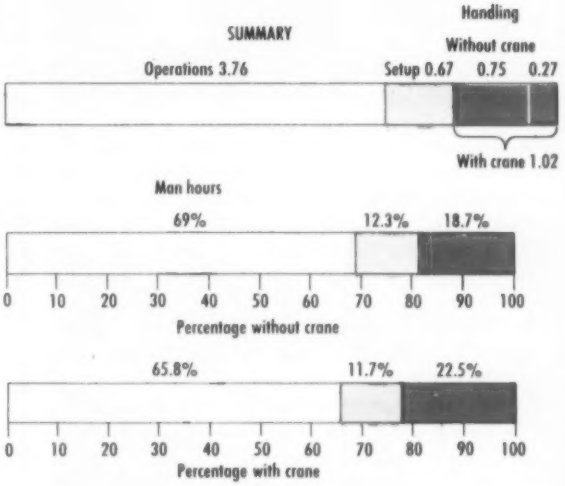
⇨ TRANSPORTATION — Positive movement between any two points. Not used for automatic movement between processes where there is no handling by manpower.

D DELAY — Delays or temporarily prevents progress to the next intended activity. Usually uncontrolled.

△ STORAGE — Keeps in recognized place of controlled safe keeping. Material stores. Component Stores. Sub-assembly stores. Tool stores. Work-in-progress stocks. Balance stocks. Marshalling areas, etc.

CAPACITY CHART shows time spent on materials handling.


TIME IN NORMAL MINUTES
Flame cut blank 8.7 1.4
Hand straighten 3.6 0.5
Mill face 7.1 6.0 2.0
Grind chamfer 4.7 2.2
Saw to length 4.4 6.5 1.2
Grind seam weld 5.4 0.5
Shot blast 1.5 2.4
Flash weld 2.1 3.6 4.1
Weld covers 7.9 0.4
Weld top 16.0 0.6
Weld ends 13.8 1.2
Clean and inspect 9.8 0.3
Operation time
Setup time
Handling time



to Handling Problems

analysis. The chart points to where you are doing too much moving, lifting, carrying. So the next step is to make a new process flow chart. Look for places where you can eliminate excessive handling or combine operations. On the two charts above (one labelled "Present Method," the other "Proposed Method"), you can see where the addition of two roller conveyors and a change in the location of the gaging machine cut handling time 20% and distance traveled 70%.

A capacity chart (right) can tell how much handling is involved in machining, processing, and assembling operations. You can use one in your effort to reduce handling times and increase output in operations that tend to slow production. It is also valuable in determining handling costs. And you can use it to compare the effectiveness of two handling systems. Time-study provides the information necessary to make up the chart. Some plants have this information in production-efficiency studies.

The example shown was devised by C. G. Chantrill & Partners, management engineers, London, to study handling costs under a proposal to eliminate an existing overhead travelling crane. The summary chart at the bottom shows the extra handling time with the use of the crane, as well as the percentage of internal handling time within the department.

". . . know equipment limitations as well as applications . . . know operating and maintenance costs."

tages. For one thing, lines of communication are much shorter and storage areas can be centralized. An up-to-date system could use vertical lift conveyors passing through the floors to provide a steady stream of materials. Elevators—limited to handling on a batch basis only—would be free for carrying passengers and heavy materials.

III. How to Choose Handling Equipment

Selection of the best handling equipment is no simple job. As you look at each piece of equipment, be sure you know its limitations as well as its application. And you should have some knowledge of operating and maintenance costs.

Selection is somewhat influenced by the type of industry. For example, the chemical process industry has few applications for overhead conveyors, while home appliance manufacturers would have trouble maintaining production rates without them. The characteristics of the materials handled also affect equipment selection.

With bulk materials, other characteristics besides size, weight, and shape must be considered. Flow properties, abrasiveness, and tendencies to dust are some of them. Contamination of either the material or the surrounding atmosphere may be a factor. The rate of bulk-material handling almost entirely fixes the size of the equipment.

Packaged goods generally do not present much of a problem. They are easily handled individually on conveyors. Palletized packages can be handled in quantity by fork trucks.

Roughly, materials handling equipment can be divided into three categories:

1. Driven by manpower and rolling on wheels.

2. Powered equipment, such as fork trucks, carriers, tractors.

3. Conveyors, including bucket elevators, pneumatic systems, and other types of continuous lifts and carriers.

Man-powered equipment handles relatively light loads within a limited area. When you select this type of equipment consider floor conditions, type and size of wheel, and the weight of the empty unit. Remember, that as the resistance to horizontal motion increases, the human energy required to move the load increases at a considerably faster rate.

The selection of powered trucks and tractors depends on whether or not simple horizontal transportation or lifting is required. Other factors are frequency of movement, distance, working space, and weight of load. But the major problem is the selection of power.

If all operations are inside, you can consider all types of power, keeping in mind that units using liquid fuel exhaust obnoxious gases. They are less suitable for use in poorly-ventilated areas.

If the unit is to be used outside all or part of the time, some conditions may call for surges of extra power. It is also probable that the distances travelled will be greater. Under these conditions liquid-fueled units—gasoline, liquified petroleum gas, diesel—are often recommended.

The electric unit has a fixed and predetermined supply of power which is generally sufficient for 8-hour operation. For this reason many plants do not use electric units for long hauls. They are most economical for hauls up to 30 meters, and are not usually used much over 175 meters. Equipment burning liquid fuels, of course, is limited only by the amount of fuel that can be carried in the individual tank and by the servicing and maintenance it requires.

Your next decision will be on the size of the fleet —the number of units needed for any one area, allowing for the possibility of expansion. For one electric unit, there may be trouble justifying the additional cost of charging equipment needed for electric batteries. In an operation involving several units, or in one that will expand, the cost of electric units, including charging equipment, drops considerably.

Here's a basic approach you can use in deciding what powered equipment to buy:

—**Analyze operating requirements** and compare these with the operating characteristics of the several types of power.

—**Analyze future needs.** Consider the possibility of standardization, maintenance facilities, replacement programs.

—**Compare operating costs,** including depreciation, maintenance, and interest on investment for the various types of power.

Handling materials by conveyors is probably the oldest and most commonly used method. Conveyors have great flexibility, few limitations, and can be made to perform several functions. For example, work can be done on an item while the conveyor moves it, and conveyors can load and unload some types of machinery. Other functions include weighing, counting, accumulating, and segregating.

The correct conveyor for any particular situation depends principally on the size, shape and weight of the item conveyed.

Here are some rules to guide your selection:

—Gravity is the most economical motive force.

—Equipment built for motion should be kept in motion; idle equipment is expensive.

—Continuous movement of material is more economical than intermittent movement.

—Handling cost is generally proportional to the size of the load.

Equipment cost can be justified only if it will provide a "yes" answer to one or more of these four questions:

Does it increase production? Does it reduce production costs? Does it conserve human energy? Does it increase safety?

Do not neglect safety. Statistics in the U.S.A. reveal that about 22% of all industrial accidents occur while moving and lifting materials. And they cost industry $400-million each year.

So management has an immediate interest in safe

handling methods. And management cannot afford to neglect safety features in the handling equipment selected.

You can assign a monetary value to each of the other questions. This will represent the direct savings if the equipment is purchased. But there is more to it. Management should know the annual cost and the percent of return on its investment. So you have to consider depreciation, annual operating and maintenance costs, taxes and insurance. All of these enter into the annual cost of owning the equipment and must be balanced against the direct savings to determine the annual rate of return.

IV. Controlling a Handling Program

Once you have organized a materials-handling system, the next problem is one of control.

Materials handling is as much a management concern as is purchasing, production, and marketing. Ideally, it should be supervised by a full-time expert just as the other departments are.

You get an idea of how the materials-handling function fits into different-sized manufacturing units from this table:

Type of Business	Number of Employees	Materials Handling Function
One-man	Up to 50	President and/or chief supervisor
Small	50 to 250	Production engineer or methods engineer
Medium	250 to 1000	Materials handling and methods section of production department
Large	1000 and up	Materials handling and layout section in a department of production division.

Practically all companies place materials handling within the purview of the production department. Thus the most useful place for the materials handling engineer would be under a company's chief production engineer.

The handling engineer's duties should include:

—Supervision of flow and storage of materials.

—Plant layout (at least on a consulting basis).

—Supervision of all handling equipment.

—Receiving, packaging, shipping.

—Share in responsibility for maintenance of handling equipment. No system can be better than its maintenance.

Knowing costs is basic to controlling materials handling. Probably the quickest way to get at costs is by departments. Management knows—or should know—what it costs to run each department. Then it must break down each department's operating cost and extract those costs—moving, shipping, packaging, storage—that apply only to handling.

Costs of handling equipment, wages of drivers, loaders, shippers make up another cost element readily available, even though they may be charged to departments other than handling.

Finally, time-study analysis of certain produc-

(Handling continues on next page)

1 PARTS arrive by truck; platform levels with truck. Fork truck moves parts to storage.

2 LIFT TRUCK stacks pallets four or five high. Truck needs only 1.5 meters to maneuver.

3 TRANSPORT is provided by a "Towveyor" system, 1000 meters long. Trolleys have pins that connect through a slot in the floor with dogs on a moving belt. A trolley is detached by lifting the pin.

4 ORDERS are removed from trolley at dispatch section and packed for shipment.

5 CONVEYOR (left) carries orders to shipping section. Heavy crates are handled by a hoist.

Handling Spare-Part Orders

One depot for spare parts service replaced several centers scattered all over the country for Ford Motor Co. Ltd. (England). Complete mechanization of handling reduced process time from weeks to days; now deliveries and shipments are handled on a continuous flow basis. Deliveries are received at a loading dock on one side of the depot, while orders leave on the other. (*Business*)

"Even with the most up-to-date handling system, management will have to keep its eye on the future."

tion operations will provide some facts on manufacturing handling costs. You can refer to your capacity chart for much of this data. From this, percentages can be derived that represent total expense of handling during processing.

Total handling cost is a combination of these preceding cost elements. The cost analysis outlined above, of course, is greatly simplified. You will have to decide on cost classifications, and you will need a good system for paperwork control.

Once a program is operating, compare its benefits with those listed by the Productivity Team on Materials Handling of the Anglo-American Council on Productivity. A good materials-handling system should:

—Reduce indirect labor costs.

—Increase production and at the same time reduce volume of work in process.

—Enable operators to work at a more consistent level of productivity because of less fatigue; and more easily maintain quality standards.

—Reduce time and labor at the shipping and receiving points, and allow for better inventory control.

—Provide greater industrial safety, and better morale of workers as they operate mechanized equipment instead of doing hard manual labor.

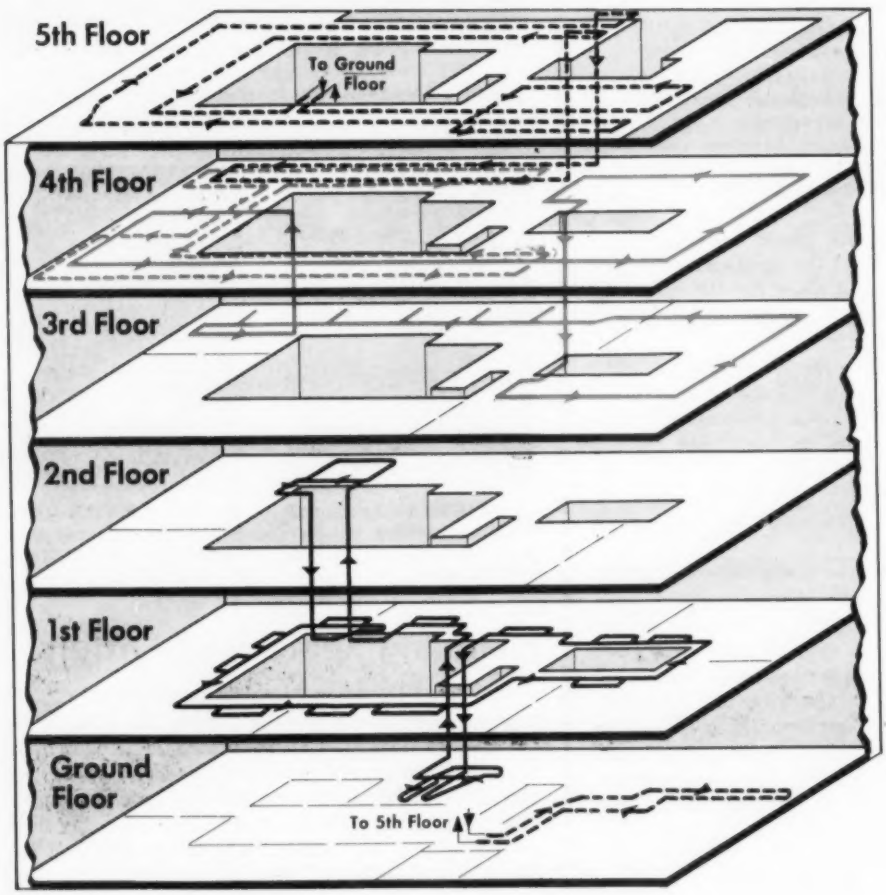
—Encourage, and sometimes enforce, improvement of plant and building layout.

V. Automation's Impact on Handling

Even with the most up-to-date handling system, management will have to keep its eye on the future. First of all there will always be better ways to move materials. And as production techniques change, handling will have to adapt itself.

The most important techniques on the horizon involve "automation." Some people define automation as the automatic handling of parts between progressive production processes. But this definition is steadily expanding to include areas other than production. You will find it influencing such

Automatic Conveyor System Raises



All conveyors are of the overhead chain type. Conveyors 1, 2 and 4 are loaded and unloaded manually; 3 unloads automatically at predetermined destinations.

things as packaging, storing, loading, accounting.

The development of the unit-load concept (a number of pieces on a pallet that can be moved as one load) will spur automation's progress. The manufacturer will have his raw materials supplied by the vendor in unit loads. The unit loads will be designed to allow a predetermined amount of material to move automatically to the point of use in each specific manufacturing operation.

One other feature of automation is likely to make itself felt in future materials-handling operations. Data-processing techniques permit a great deal of information-collecting and analysis. Much of this can be related to materials handling. Already data processing maintains inventory records. The next step beyond this might be the control of a "mechanized warehouse" and production system.

To be sure, the "automated" warehouse is feasible only in larger, long-run, high-volume production plants today. But in smaller plants as well as large ones, materials handling will be one of the most important activities that are controlled by the information collected, and the instructions issued, by electronic data-processing machines. ●

Output, Cuts Cost

Forty men who once pushed carts from machine to machine now do more productive work at Fabricas Argentinas de Alpargatas S. A. I. C. (Buenos Aires). When this fabric, slipper, and shoe manufacturer decided to modernize the handling system in its old six-story plant, it turned to conveyors.

Four separate conveyor belts weave through the six-story building (left). One overhead belt features automatic unloaders. It has five feeder lines and stations, and an electric coding system permits the operator at each station to control the destination of trays hooked to the conveyor. At the coded destination, a trigger mechanism lowers the tray's contents to the floor for unloading. The empty tray then goes back along the belt.

The other belts are loaded and unloaded by the machine operators. All conveyors make a complete circuit of the plant in about 45 minutes.

None of the four conveyors stop during working hours—except, of course, in case of a mechanical breakdown. So far, the record has been excellent.

Two people per shift supervise the system. Preventive maintenance is carried out on a daily, weekly, and monthly schedule. Records are kept of all inspections and repairs. For spare parts, Alpargatas draws on both local industry and imports. Imported gears, chains, and rails are preferred.

Alpargatas reports an increase in production without an addition to its workforce. Even though the company's type of product might better lend itself to a horizontal plant layout, the conveyors make possible highly efficient handling and production in an old multi-story building. (*Ingenieria Internacional Industria*)

For More Information

There are many sources you can draw on for help with handling problems. Many books and periodicals serve the field. Here are just a few current books:

Industrial Materials Handling, Lincoln Extension Institute Inc., 1401 W 75th Street, Cleveland 2, Ohio, U.S.A. Price: $4.75.

Layout Planning Techniques, Materials Handling, both by John R. Immer. McGraw-Hill Book Co., 330 W 42nd Street, New York 36, New York, U.S.A. Prices: $6.50 and $8.50.

Mechanical Handling and Storing of Materials, by George F. Zimmer. Technical Press, Ltd., Kingston Hill, Surrey, England.

Modern Methods of Materials Handling, by Materials Handling Institute. Prentice-Hall, Inc., Rte 9W, Englewood Cliffs, New Jersey, U.S.A. Price: $6.65.

Materials Handling and Distribution. Division of Industrial Development, 203 Collin Street, Melbourne, C.1, Victoria, Australia.

Plant Layout and Materials Handling, by James M. Apple. Ronald Press Co., 15 E 26th Street, New York, New York, U.S.A. Price: $7.00.

Mechanical Handling (monthly periodical) Dorset House, Stamford Street, London, S.E.1, England.

The materials-handling societies scattered throughout the world can be most helpful as a means of exchanging ideas. Here are some of them:

Arbeitsgebiet Materialfluss im Rationalisierungs Kuratorium der Deutschen Wirtschaft (RKW), Frankfurt am Main, Germany.

Mechanical Handling Association of Southern Africa, Barclays Bank Building, Third Floor, Corner Commissioner and Harrison Streets, Johannesburg, South Africa.

Mechanical Handling Engineers Association, 94-98 Petty France, London, S.W.1, England.

Japanese Material Handling Society, c/o Japan Productivity Center, No. 1, 2-chome, Ginz-Nishi, Chuo-ku, Tokyo, Japan.

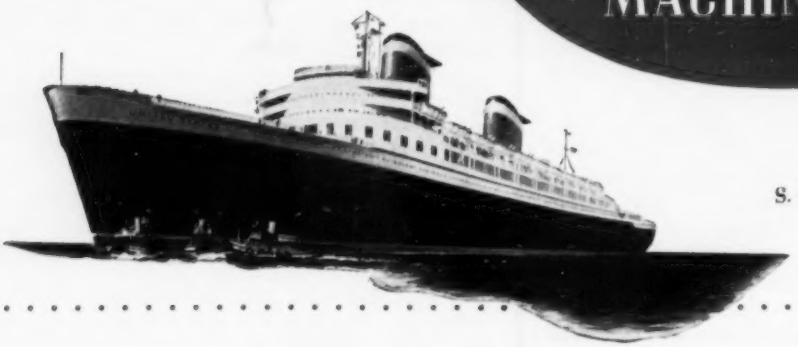
Centre D'Information de la Manutention, 10, Avenue Hoche, Paris VIII, France.

Materials Handling Institute, 1 Gateway Center, Pittsburgh, Pennsylvania, U.S.A.

Finally, do not overlook the equipment manufacturers. They can be an important source of information. And MANAGEMENT DIGEST **will continue to report new developments in both equipment and management techniques as they appear.**

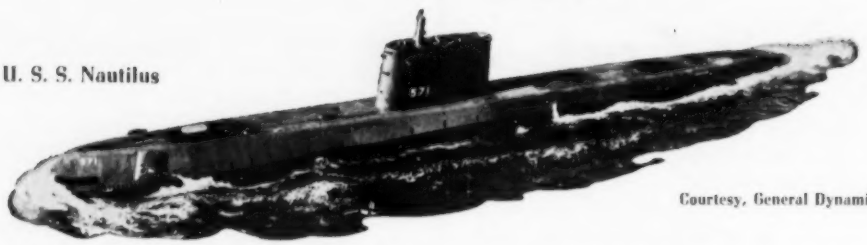
The PRECISION GEARS which Drive these Great Ships were Finished on . . . . . .

RED RING HORIZONTAL SHAVING MACHINES



S. S. United States

U. S. S. Nautilus



Courtesy, General Dynamics Corporation

U. S. S. Forrestal

Red Ring horizontal rotary shaving machines were used by Westinghouse Electric Corporation to finish the main propulsion gears of these great ships and many others.

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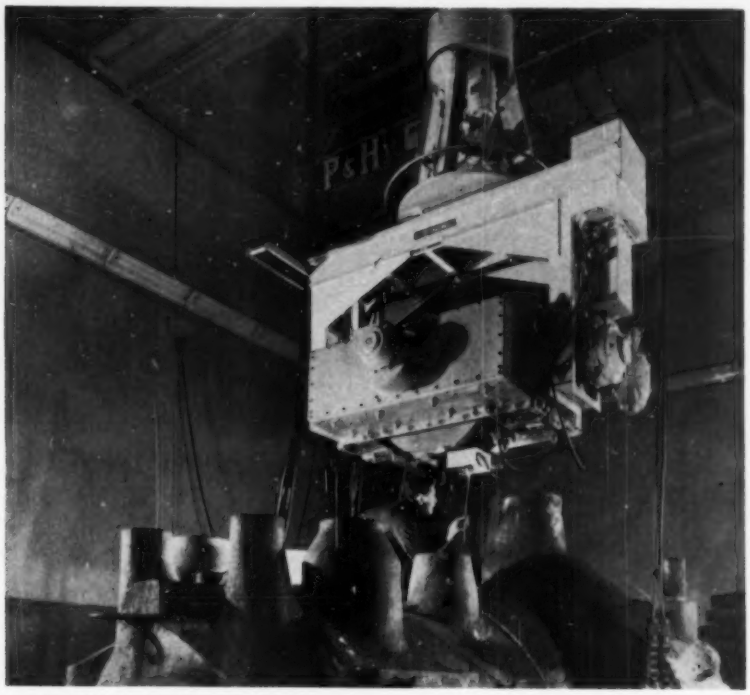


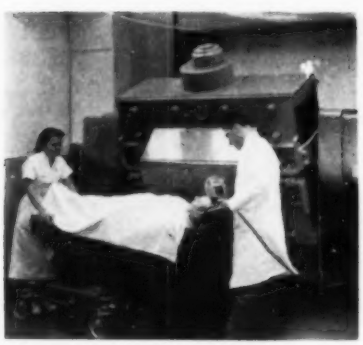
22 MV INDUSTRIAL BETATRON is shown at work inside laboratory. Supported by crane, the machine can be moved into position for each exposure.

The Betatron—New Tool for Industry and Medicine

Over the past six years the betatron has emerged as a powerful radiographic tool—with an important future ahead of it.

Betatrons in use now range in size from 2- to 300-million volts. The 22 mv. to 24 mv. (million volts) betatron, built originally for laboratory research, is now at work:

In Industry—Chiefly in the inspection of forgings and castings, to supplement 220,000-volt X-ray and cobalt 60 radiographic facilities. Some manufacturers are finding the demand for X-ray quality castings—for nuclear reactor pumps, power plants, extreme high pressure steam turbine casings—large enough to warrant the high cost of a betatron radiation laboratory.



MEDICAL BETATRON treats certain types of cancer in a private clinic. It is rated at 24 mv.

In Medicine—Employed so far mainly as a research tool, the betatron is now playing an important part in the struggle against cancer. A private American clinic has recently installed one for the treatment of cancer patients.

In Medicine and Industry Combined—Betatrons are expensive machines to install, but some private organizations have thought out ways of solving the problem. At the clinic (left), the unit serves a double purpose: After treating the sick during the day, it is used during evening hours by industrial technicians for testing and inspecting materials. Within industry itself, private foundries and manufacturers may be able to take custom work from other companies to help defray costs. Not only is the betatron expensive (the ones pictured here run up to $85,000), but a special building has to be set up to accommodate it, about doubling the equipment cost.

The betatron in the left-hand picture is at work in the plant of its manufacturer, Allis-Chalmers Manufacturing Co. (Milwaukee, Wisconsin, U.S.A.). Two other private companies have recently installed betatrons for inspection work; other industrial betatrons are used in the manufacture of military equipment.

Automatic Card File

A new motorized elevator file is said to eliminate the "back-breaking" work of file clerks. The "63" Super Elevator File makes records available in three seconds by the push of a button, thus doing away with stooping, stretching and pulling to find a record.

Individual push buttons are indexed to identify the record breakdowns in each pan of records in the file. Labels on trays further identify the record grouping. The elevator file requires less than 23 square feet of floor space to house over two hundred thousand 5 x 3-inch records. **Diebold Inc., International Div., 818 Mulberry St., S.E., Canton 2, Ohio, U.S.A.**

"No-Shift" Transmission For New Platform Truck

The new "Freighter" platform truck transports loads of up to 4000 pounds through confined aisles and crowded areas—with fully automatic drive.

The air-cooled engine provides 8.1 horsepower at 3000 revolutions per minute, enough power, the manufacturer says, to negotiate ramps up to 10% with full load. The truck can be operated at speeds up to 10 miles per hour. **Hyster Co., 2902 N. E. Clackamas St., Portland 8, Oregon, U.S.A.**

To-morrow *is not so far away :*

Renault proves it **to-day**

Yes, Renault does think of the future. The future will, for one thing, be shaped into a turbine car. This is why the Etoile Filante has been designed, a car which during the very first test run on the Salt Lake tracks, broke 4 international records at a speed of nearly 192 MPH. The Etoile Filante is not a racing car but a traveling lab enabling the engineers to work out the hard task of adapting the aircraft turbine to car-driving.

These men also had to tackle yesterday with the engineering problem of designing a new model of an economical car. These men designed the **Dauphine,** this wonderful car with accommodation for four, wich was acclaimed by technical experts in all countries as one of the finest achievements of the last 10 years.

Commercially, the Dauphine proved to be an outstanding success, within a few months. It worked like magic but it wasn't. There is no magic in the field of large volume manufacturing. Every step forward is backed by extensive research work and testing on numerous prototypes until the final development stage is reached.

This explains why the Dauphine is daily a delight for thousands of motorists who cannot imagine that hundreds of technicians have carefully been considering every detail of it for years, with the same thoroughness they are now devoting to other yet secret, assignments.

An automobile is a team work achievement. If you admire the Etoile Filante, you can also have confidence in the Dauphine and in all the other models of the Renault manufacture. They all have the same offspring and the same quality.

The present is merely yesterday's future and we have no short range policy at Renault.

THE RENAULT DAUPHINE
SETS THE PACE
IN YEARS-AHEAD CARS

MORE PRODUCT DIGEST

Electric Door Opener

An automatic, electrically-powered door opener has been designed to fit any type of manually operated door. For converting manually opened doors, the unit is mounted in a floor case concealed below the floor.

Control devices on the electrical unit include an automatic all-weather floor mat and electric-eye type, as well as a variety of semi-automatic switches. A built-in automatic check permits manual operation of the door.

Any 110-volt electrical outlet can be used as a source of power. **Electric Power Door Co., 2127 E. Lade St., Minneapolis, Minnesota, U. S. A.**

Power Paper Cutter

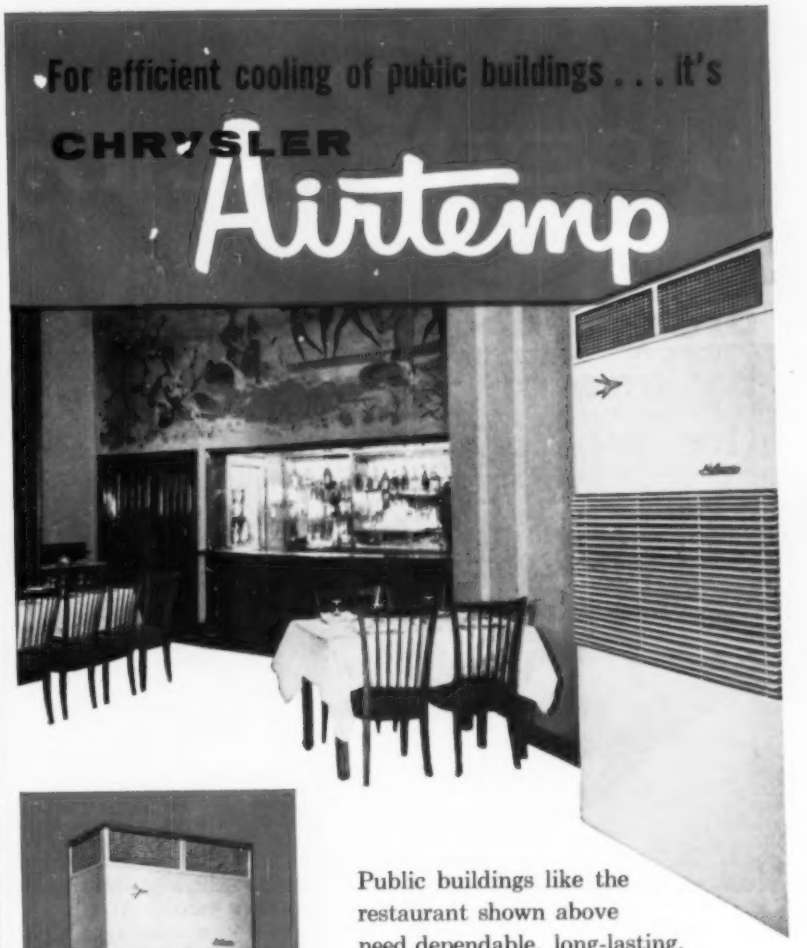
A new power paper cutter will trim booklets, separate continuous fanfold forms, divide finished records, and provide special paper and card sizes. It occupies a surface area of less than three square feet and can be mounted on a table, desk or cabinet.

Safety features include a dual push button control. Both hands are needed to engage the cutting mechanism. Even if one hand is removed from a button, all action stops. The cutter incorporates a hydraulic clamp that automatically secures the paper in a fixed position, insuring square accurate cuts. **Addressograph-Multigraph Corp., 1251 Babbitt Road, Cleveland, Ohio, U. S. A.**

Miniature Soldering Iron

A miniature soldering iron, especially developed for use with miniaturized and printed circuitry, weighs less than 1½ ounces. Very small connections can be soldered inside equipment with a minimum of heat loss or damage to adjacent wiring, insulation, and terminals.

A tiny tubular heater, located in the extreme tip of the iron, develops a tip temperature of 750° F. to 850° F. **International General Electric Corp., 150 E. 42nd. St., New York 17, New York, U. S. A.**



Water-cooled "Packaged" Unit, available in a wide horsepower range. Needs only electric, water and drain connections. Can be installed singly or in multiple to meet virtually every requirement.

Public buildings like the restaurant shown above need dependable, long-lasting, efficient air conditioning. And that's why Chrysler Airtemp is so often the choice for cooling and dehumidifying hospitals, schools, hotels and similar projects.

There are economical Airtemp units for every need, every type of building. Water-cooled or air-cooled, packaged Airtemp units are easy to install, operate quietly, need minimum maintenance, and are designed by famous Chrysler engineers and stylists.

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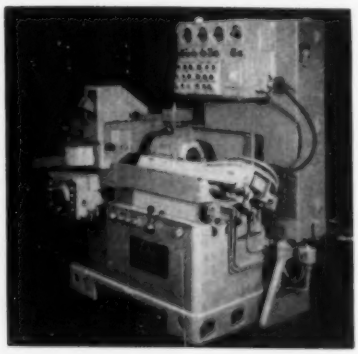
MORE PRODUCT DIGEST

Wood-Veneer Laminate

A new wood-veneered laminated sheet called "Pagholz" permits extensive forming through pressing. The material requires no surface treatment and is water resistant, scratch resistant, free of pores, glossy, flame resistant, tropic and termite resistant without being lacquered. The large-sized sheets speed construction.

Veneers 0.4 mm thick are saturated with a phenolic resin in a vacuum until they contain 30% to 35% resin. During the pressing process with pressures of 100 to 400 kg/cm², the individual veneers are, as a result of their resin content, welded together in contrast to the gluing which makes plywood. Separation of the individual layers of Pagholz is thus eliminated. **Presswerk A. G. Essen-Bergeborbeck, Germany.**

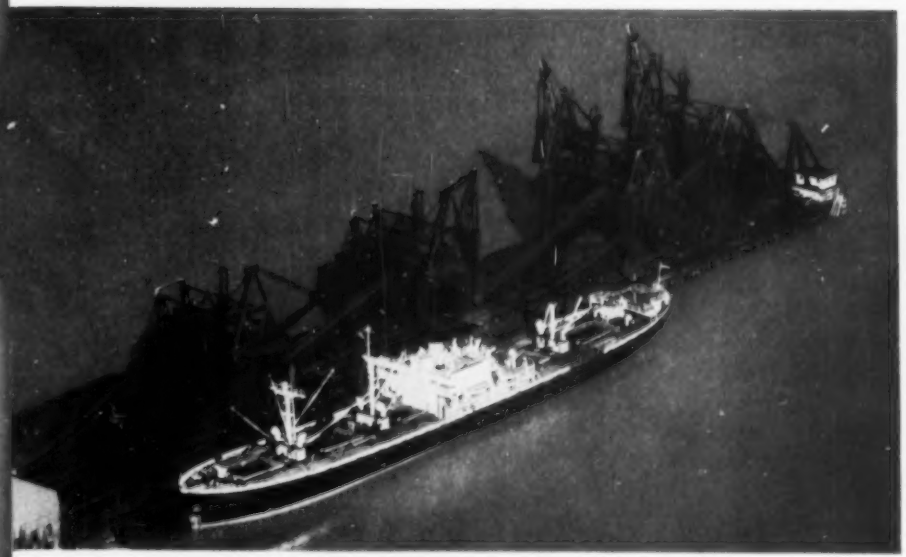


Internal Grinder Cuts Cycle Time up to 50%

With this Centri-Matic grinder cycle time can be cut by up to 50% on work in the upper size ranges. Designed with the wheelhead table inclined at an angle of 30° to the work, the machine is available in two models: model 190A for straight taper boring, 1901A for ball track grinding on work up to 3¼ inches OD.

Both are fully automatic machines for small to medium work requiring precision internal size and finish, such as anti-friction bearings, retainer rings, gear blanks, refrigerator compressor rolls, and bushings. **The Heald Machine Company, Worcester 6, Massachusetts, U.S.A.**

B&O LINKS BITUMINOUS BOUNTY WITH OVERSEAS MARKETS



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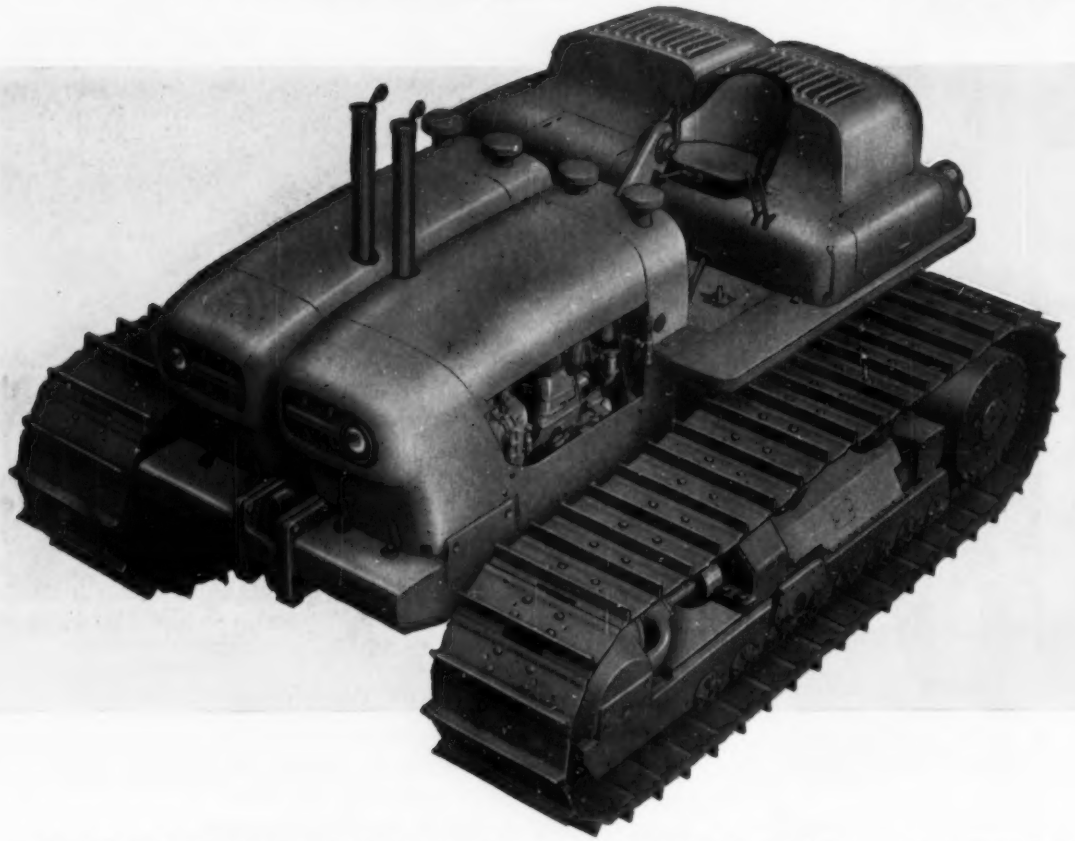

Ever since it was introduced more than a year and a half ago, the Euclid TC-12 Tractor has set completely new standards of crawler production and performance. It has proved, on job after job, that it is years ahead of the field in ability to do more work—faster, easier and cheaper. Now the TC-12 has even more power to handle the biggest tractor jobs.

Powered by two 218 h.p. engines with separate Torqmatic Drives for each track, there's a total of 436 horsepower. Big 27″ standard shoes and 8 track rollers give good balance with the additional horsepower, heavy duty dozer blades and other attachments.

This new TC-12 Crawler has many other improvements that put it even further ahead of other tractors . . . in performance, ease of operation, maneuverability and service accessibility. Ask the Euclid dealer in your territory to prove that the TC-12 has no equal for any big tractor job. He has facts and figures that will show you why ***Euclids are your best investment.***

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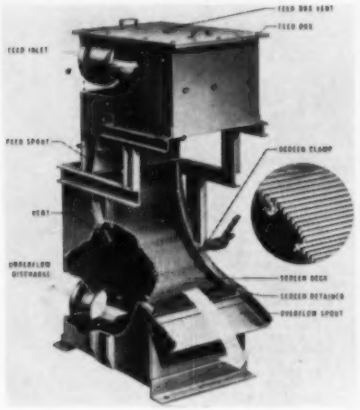

New Screen for High Capacity Separation

Model DSM screen is for the continuous wet screening of slurries containing non-fibrous solids. This new stationary screen is particularly adaptable to separations in the 8 to 48 mesh range and to date has been successfully applied to classifications in the metallurgical, non-metallics, chemical and food industries.

The new screen is basically a concave, horizontal-wedge bar screen secured in a stationary housing. An integral part of the housing is a feed box equipped with both an inlet port and feed spout. The latter serves to distribute incoming slurry across the full width of the screen.

Undersize material which passes through the screen is collected in the lower part of the housing and is discharged through another port while oversize product flows across a lip at the base of the screen. **Dorr-Oliver Inc., Barry Place, Stamford, Connecticut, U.S.A.**

Motor Generator

A new line of motor-generator welders features pre-lubricated sealed bearings, controlled current peaks, and space-saving design. The welders may be stacked—one atop the other.

The welders are designated WD30AE and WD40AE. An improved magnetic starter with fast response, bi-metallic thermal overload relays prevents motor burnout in the event of motor overload. The relays will kick out in less than ten seconds in stalled single phase, and in less than eight seconds if the rotor is locked in normal three-phase position.

Built with push-button controls, the new units include generator, driving motor, and accompanying controls, all encased in a weather-resistant, self-ventilated case. **International General Electric Co., 150 E. 42nd. St., New York 17, New York, U.S.A.**

Prefabricated Steel Buildings

A line of rigid-frame steel buildings, suitable for warehouses, manufacturing plants, stores or community buildings, can be ordered in any of three standard widths—40, 50, and 60 feet—or in multiple units. They can be built in any length in multiples of 20 feet.

The straight sidewall buildings consist of a tapered frame, roof structurals, and roof panels. The buildings are designed to give an unobstructed interior and have structural strengths to meet wind and snow load requirements.

Only size, arrangement and accessories need be specified. The structural design and details are pre-engineered. Accessories include sliding and service door; pivoted windows, louvers, roof ventilators and plastic skylights. **Alberto Ubbelohde, 150 E. 42nd St., New York 17, New York, U.S.A.**

Prevents Overloading of Forging Press

A new feature of this redesigned high-speed forging press is a tonnage limiter, which prevents accidental overloading of the press. It works by automatically reducing the air pressure on the clutch as the slide approaches the bottom of the stroke, and increasing it on the return.

The brake has also been redesigned as a double rather than a single clam-shell type. This increases braking area and, along with a larger cylinder, doubles the braking effect. **E. W. Bliss Company, Canton, Ohio, U.S.A.**

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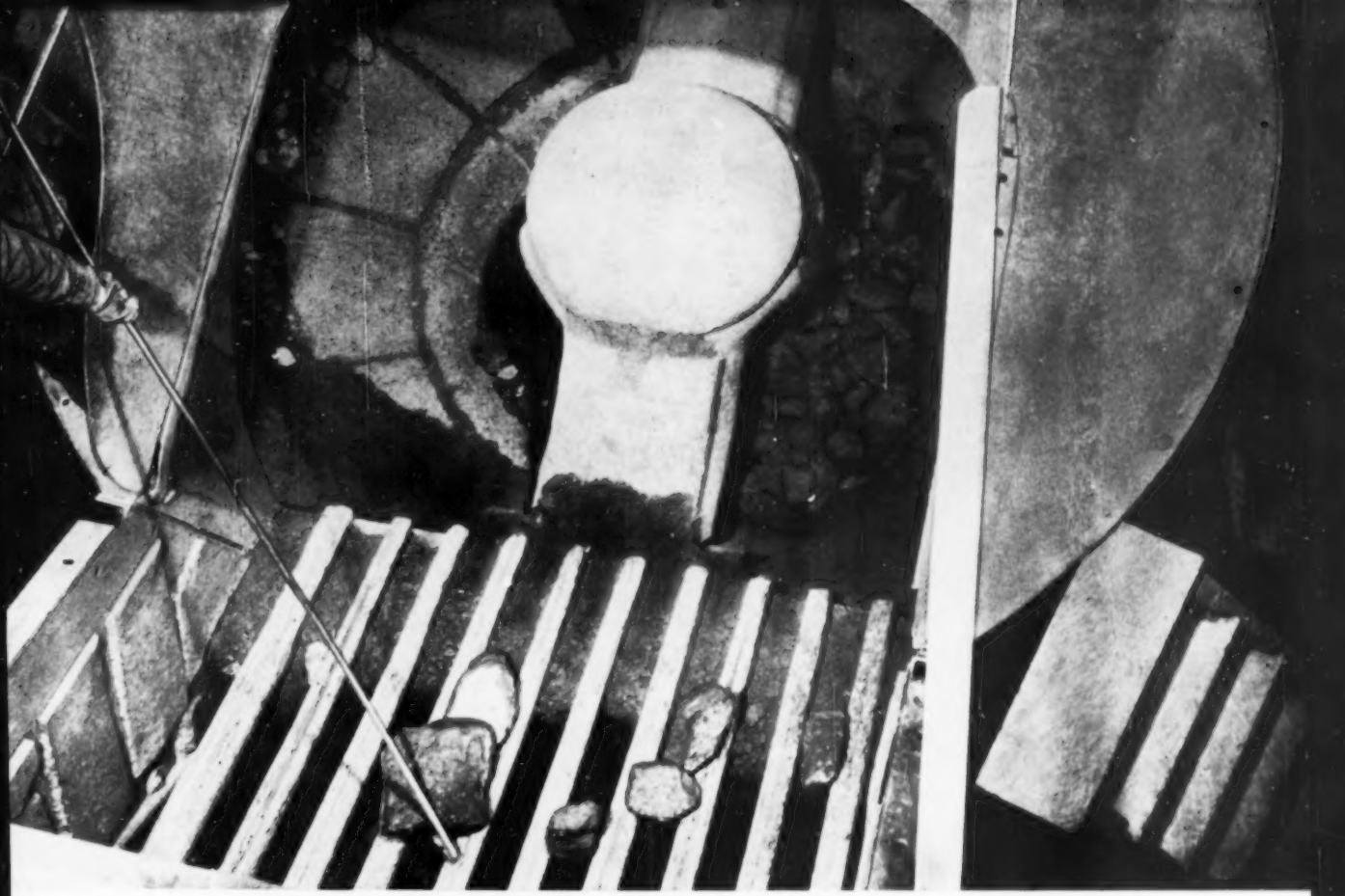

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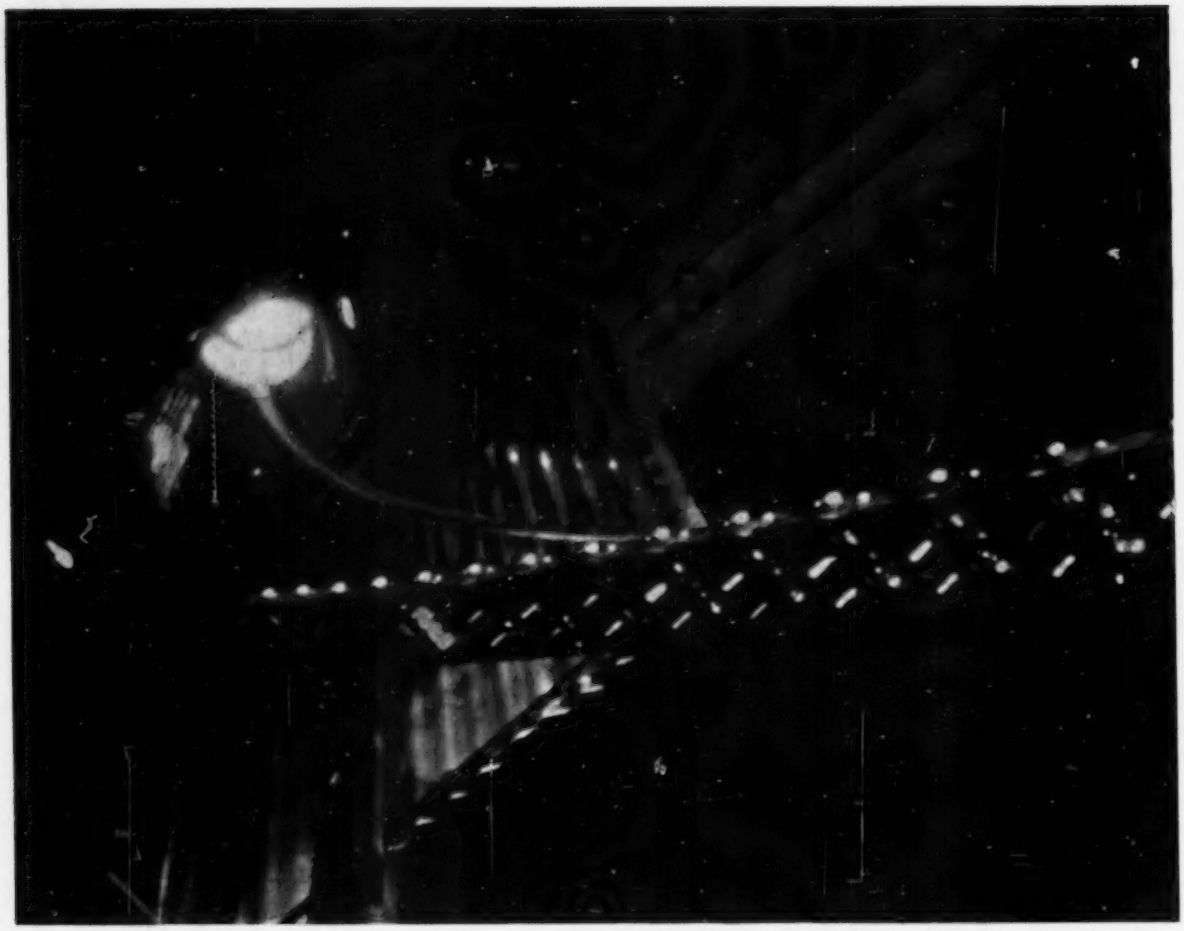

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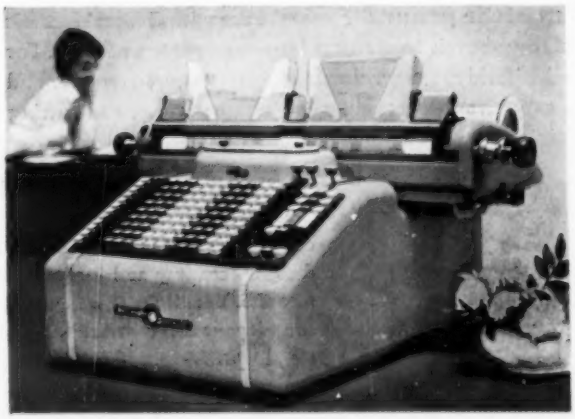

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